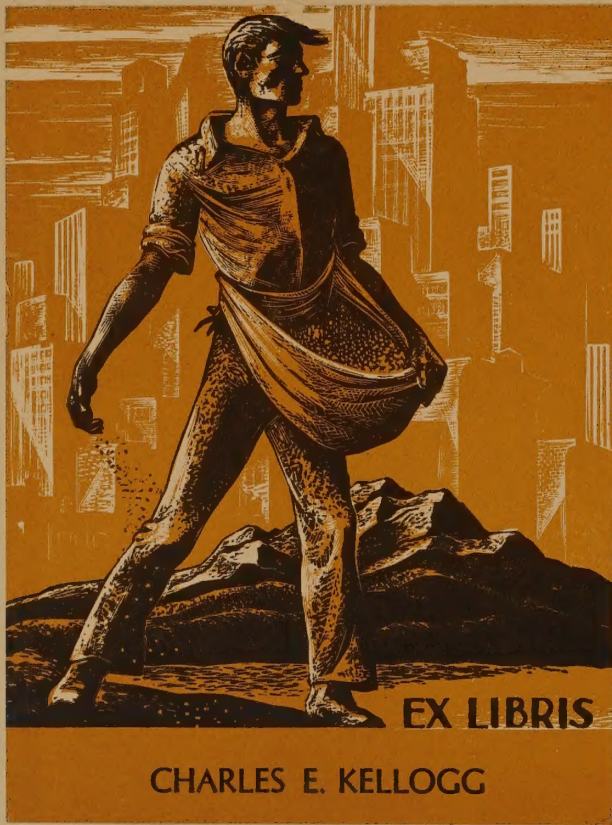




I N D I A J O U R N A L

(Also including notes for stops in Iran,
Thailand, Viet Nam, Hong Kong, Japan, and Hawaii.)

CHARLES E. KELLOGG

Volume II

February 27 through April 29

1959

PREFACE

This Journal covers mainly work in India but includes also stops in other places, especially Viet Nam, Japan, and Hawaii. The full report of the Mission is not included within this Journal.

An Appendix volume for this India Journal contains papers of special relevance to the text of the Journal. Some of these are referred to at the bottoms of the pages of the text by Roman numerals corresponding to the table of contents of the Appendix volume. Thus a note at the bottom of the page, such as Ap. I, means that one or more supporting documents are in that section of the Appendix volume.

TABLE OF CONTENTS

Volume I

	<u>Page</u>
Introduction	1
New York	3
Paris	5
Rome	6
Teheran	8
Teheran to Delhi	16
Delhi	18
Republic Day	22
Preliminary sessions	23
Khanpur Village	51
Delhi to Chandigarh	55
National Dairy Research Institute	56
Nilokheri	60
Chandigarh	62
Soil Conservation Research Station	69
Bhakra Dam	72
Kohara Village	76
Jogiana Kanganwal Garden Colony	78
Ludhiana, Agricultural College	81
Chandigarh to Delhi	88
Butana Village	88

Delhi

	<u>Page</u>
Conference of State Ministers of	
Agriculture	93
Poosa Institute	103
More preliminaries	106
Central Power and Water Commission	108
Minister Day of Community Development	112
Planning Commission	115
Irrigation and Power	117
Food and Agriculture	119
Dinner <u>chez</u> Eskildsen	123
Dr. B. N. Uppal	128
Poosa Institute and Soil Survey Committee ..	132
Delhi to Cochin (Kerala)	134
Cochin to Trichur and return	137
Cochin, Kottayam, Trivandrum	143
Trivandrum and Cape Comorin	157
Trivandrum, Coimbatore, Ottacamund	167
Ottacamund, Mysore, Bangalore	174
Bangalore and Nandi Hill	181
Bangalore, Delhi	192
Delhi to Jodhpur	193
Jodhpur	197
Jodhpur to Ajmer	206

Volume II.

	<u>Page</u>
Ajmer to Jaipur	215
Jaipur	225
Delhi	237
Calcutta	241
Calcutta to Kharagpur	248
Kharagpur	251
Calcutta to Damra (Assam)	259
Damra	266
Gauhati to Shillong	271
Shillong and Cherrapunji	279
Shillong and Jowai	289
Shillong	299
Shillong, Gauhati, Calcutta, Delhi	307
Delhi (Mainly work on reports)	314
Ministry of Community Development	315
Planning Commission, on brick earth	321
Ministry of Food and Agriculture	331
Ministry of Community Development	333
Ministry of Finance	336
Prime Minister	338
Delhi to Srinagar (Kashmir)	340
Srinagar and environs	343
Delhi	353

	<u>Page</u>
Bangkok	354
Saigon	358
In cat-clay area	364
Red soils of Viet Nam	375
Report to Minister of Agriculture	388
Saigon to Hong Kong	391
Hong Kong	393
Japan	397
Japan to Honolulu	411
Hawaii	413
Honolulu to Washington	430
A few special words	433
Additional press notices after	434

February 27

Tea comes at 6:30; then breakfast at 7:00 and work on my notes until we leave at 7:55 for the Durgapura Experimental Station of this State just south of Jaipur. The soils are nearly level and very sandy. I suspect that originally there was a macro-relief of low dunes. The fields have high bunds and are nearly level. We pass some orchards, mainly of mangoes, and some irrigated wheat and vegetables. We turn off the main road onto a very loose sandy one that is almost impassable.

At the Station I meet Mr. M. P. Bhatnagar, economic botanist, and other staff members. They have around 100 acres for cultivation and 50 acres of orchard. Much of their work is plant breeding. They say that they escape rust on wheat by having early varieties. They have been able to combine the drought resistance of their local wheats with the yield and color of Punjab C 591 to get a variety called PS 31.1. This wheat also requires one less irrigation than the Punjab variety. They have some other promising varieties coming along by incorporating the smut resistance of wheats from the United States.

In the office I see several bajra varieties for the various rainfall areas. The heads a little bit resemble our common cat-tails, except that they are somewhat smaller in diameter. Varieties for the desert have short heads about 5 inches long and those for the more moist regions are around a foot long. These varieties suffer from smuts and other fungi and they are trying to develop some with disease resistance.

February 27

Ten comes at 6:30; then breakfast at 7:00 and work on my notes until we leave at 7:25 for the Durgapura Experimental Station of this State just south of Jaipur. The soils are nearly level and very sandy. I suspect that originally there was a macro-relief of low dunes. The fields have high bunds and are nearly level. We pass some orchards, mainly of mangoes, and some irrigated wheat and vegetables. We turn off the main road onto a very loose sandy one that is almost impassable.

At the Station I meet Mr. M. P. Bhatnagar, economic botanist, and other staff members. They have around 100 acres for cultivation and 50 acres of orchard. Much of their work is plant breeding. They say that they escape rust on wheat by having early varieties. They have been able to combine the drought resistance of their local wheats with the yield and color of Punjab C 591 to get a variety called PS 31.1. This wheat also requires one less irrigation than the Punjab variety. They have some other promising varieties coming along by incorporating the smut resistance of wheats from the United States.

In the office I see several pairs varieties for the various rainfall areas. The heads a little bit resemble our common cat-tails, except that they are somewhat smaller in diameter. Varieties for the desert have short heads about 5 inches long and those for the more moist regions are around a foot long. These varieties suffer from smuts and other fungi and they are trying to develop some with disease resistance.

They are also improving jowar (sorghum) by crosses with American sorts. They also work on maize. I see moong for very dry areas that gives 8 to 9 maunds per acre, even up to 10. They are having good luck with cowpeas grown along with bajra and jowar.

For irrigation here they have two dug wells with tubes going to 180 feet. These are operated by electric motors pumping into elevated storage tanks. (The local wells of cultivators are about 35 to 40 feet deep.)

The soil here is a deep yellowish fine sand to loamy sand without much profile differentiation.

I am taken on a rapid tour to see their experiments. (K-2799; K-2800)

First I see one on seeding rates. Most cultivators seed too heavily, perhaps partly to overcome termite damage. The station recommends 70 to 82 pounds per acre in line sowing and expect a harvest of about 10 times that. As at Jodhpur, they make no soil moisture measurements and do not measure the water used. They say they irrigate when the plants begin to wilt and the soil looks dry. With this guessing, I am sure the plots do not get uniform water. Even the plots are subdivided for irrigation into small areas with tiny bunds to hold the water.

They show me several variety trials where I am sure some of the differences are due to differences in previous soil management and in irrigation. They now have several crosses that are rust resistant.

They are also improving Jowar (sorghum) by crosses with American sorts. They also work on maize. I see mango for very dry areas that gives 8 to 9 maunds per acre, even up to 10. They are having good luck with cowpeas grown along with bajra and Jowar. For irrigation here they have two wells with tubes going to 180 feet. These are operated by electric motors pumping into elevated storage tanks. (The local wells of cultivators are about 35 to 40 feet deep.)

The soil here is a deep yellowish fine sand to loamy sand without much profile differentiation.

I am taken on a rapid tour to see their experiments. (K-2399)

K-2300

First I see one on seeding rates. Most cultivators seed too heavily, perhaps partly to overcome termite damage. The station recommends 70 to 82 pounds per acre in line sowing and expect a harvest of about 10 times that. As at Jodhpur, they make no soil moisture measurements and do not measure the water used. They say they irrigate when the plants begin to wilt and the soil looks dry. With this guessing, I am sure the plots do not get uniform water. Even the plots are subdivided for irrigation into small areas with tiny bunds to hold the water.

They show me several variety trials where I am sure some of the differences are due to differences in previous soil management and in irrigation. They now have several crosses that are rust resistant.



K-2799. February 27, 1959. Durgatura Station near Jaipur. General view of small plots of grass, vegetables, etc.



K-2800. February 27, 1959. Durgatura Station near Jaipur. View of part of experimental area from water tank.

K-2799.

February 27, 1959. Durgam Chattri Station
near Jaipur. General view of small plots
of grass, vegetables, etc.

K-2800.

February 27, 1959. Durgam Chattri Station
near Jaipur. View of part of experimental
area from water tank.

I see quite a lot of damage from termites. I pull up one or two of these yellowish plants and see that the roots are nearly all eaten away. I am told that research on termite resistance is very difficult because of the great variations in their numbers from place to place and from season to season.

They have no greenhouse so they use cloth tents for cover to test against rust.

I see several small test plots for both irrigated and unirrigated grass varieties. They are trying various kinds for spreading in order to find the ones most useful for soil protection. Several French varieties of lucerne are under test. They get excellent results with Pennisetum purpureum under irrigation. But under either dry or irrigated conditions their best grass is Cenchrus ciliaris.

They are also doing a lot of work on cumin. The crop is improved by soaking the seeds in growth-promoting hormones, which causes a much better set of seeds. They should like to improve this crop because it is a good dollar earner and sells for Rs 250 per maund. It is sown late in the Rabi season and good cultivators get 4 to 5 maunds per acre although the average is only 3.

They also have a small group of sugarcane varieties from Coimbatore although little cane is grown in this region.

Although there is no cotton now they have variety trials in the Kharif season. The old cotton stalks are used for training the peas in the trials with that crop.

I see quite a lot of damage from termites. I pull up one or two of these yellowish plants and see that the roots are nearly all eaten away. I am told that research on termite resistance is very difficult because of the great variations in their numbers from place to place and from season to season.

They have no greenhouse so they use cloth tents for cover to

test against rust.

I see several small test plots for both irrigated and unirrigated grass varieties. They are trying various kinds for spreading in order to find the ones most useful for soil protection. Several French varieties of lucerne are under test. They get excellent results with Pennisetum purpureum under irrigation. But under either dry or irrigated conditions their best grass is Cenchrus ciliaris.

They are also doing a lot of work on cumin. The crop is improved by soaking the seeds in growth-promoting hormones, which causes a much better set of seeds. They should like to improve this crop because it is a good dollar earner and sells for Rs 250 per maund. It is sown late in the Rabi season and good cultivators get 4 to 5 maunds per acre although the average is only 3.

They also have a small group of sugarcane varieties from

Colombatore although little cane is grown in this region.

Although there is not cotton now they have variety trials in the Kharif season. The old cotton stalks are used for training the peas in the trials with that crop.

Then I come to a series of plantings of wheat and barley resulting from nuclear mutations. It seems to me that they have all the mutations they need already. They also show me individual mutations from oil and chemical treatments. Seeds treated with manganous sulphate give good results but I suspect this is purely a nutritional effect.

They have introduced a group of cumin varieties from Bulgaria and other countries but none is wilt resistant.

Fulton oats from the United States do well here. They give two cuttings of green fodder and a little grain.

They are testing wheats for salt tolerance but I don't believe the controls are adequate. They have a local variety of high tolerance to salt called kharchie, from the name given to salty areas, but it is susceptible to rust. They claim that local growers prepare the land, broadcast the seed, cross cultivate twice, and then irrigate. Yields are had of 12 maunds per acre.

They have just started some fertilizer experiments on wheat with 3 levels of N, P, and K on three varieties. They are using ammonium sulphate, ammonium sulphate nitrate, urea, superphosphate, and muriate of potash. Their earlier work shows responses to nitrogen but little to phosphate.

I see patches of termite damage on the wheat in various places. Because of the irrigation and vegetation there is not much soil blowing on the Station itself but there is on nearby fields.

Then I come to a series of plantings of wheat and barley resulting from nuclear mutations. It seems to me that they have all the mutations they need already. They also show me individual mutations from old and chemical treatments. Seeds treated with manganese sulphate give good results but I suspect this is purely a nutritional effect.

They have introduced a group of cumin varieties from Bulgaria and other countries but none is wild resistant. Fulton oats from the United States do well here. They give two cuttings of green fodder and a little grain.

They are testing wheats for salt tolerance but I don't believe the controls are adequate. They have a local variety of high tolerance to salt called Kharchik, from the name given to salty areas, but it is susceptible to rust. They claim that local growers prepare the land, broadcast the seed, cross cultivate twice, and then irrigate. Yields are had of 12 mounds per acre.

They have just started some fertilizer experiments on wheat with 3 levels of N, P, and K on three varieties. They are using ammonium sulphate, ammonium sulphate nitrate, urea, superphosphate, and mixture of potash. Their earlier work shows responses to nitrogen but little to phosphate.

I see patches of termite damage on the wheat in various places. Because of the irrigation and vegetation there is not much soil blowing on the station itself but there is on nearby fields.

They are getting good results with groundnuts in the Kharif season with Indian and especially Brazilian varieties.

Now we go to the inevitable tea. They complain greatly about lacking equipment. They have adequate appropriations in rupees but no foreign exchange for microscopes and the like. I point out to them that they can make moisture determinations and measuring devices for irrigation water without foreign exchange. They agree and smile unsweetly.

At tea Mr. K. M. Mehta, Agricultural Chemist for Rajasthan speaks of the heavy soils planned for irrigation in the Kota area. They built a dam and will have water for some 550,000 acres. He shows me many data that indicate clearly that the soils are rich in clay and have the kankar layer at 1 to 3 feet. The slopes are said to run about 1 to 2 percent. Some of the soils have some salt. They hope to build bunds and level between them. I think he realizes, but I emphasize anyway, that this will be a very tricky business. Any leveling operation that brings the kankar closer than 12 inches will produce an unfit soil. Doubtless they will need to provide reasonably deep drainage ditches. I hope very much that they can get a good expert in this area before they spend much money on it. From what he says they will also need some gypsum treatments with flooding and heavy manuring. This project could turn out very badly.

They talk about a deficiency on the citrus. Zinc helps some but no treatments have cured it. Since nematodes here are said to attack barley and wheat they may be responsible.

They are getting good results with groundnuts in the Kharif season with Indian and especially Brazilian varieties.

Now we go to the inevitable tea. They complain greatly about lacking equipment. They have adequate appropriations in rupees but no foreign exchange for microscopes and the like. I point out to them that they can make moisture determinations and measuring devices for irrigation water without foreign exchange. They agree and smile unweeily.

At tea Mr. K. M. Mehta, Agricultural Chemist for Rajasthan speaks of the heavy soils planned for irrigation in the Kota area. They built a dam and will have water for some 550,000 acres. He shows me many data that indicate clearly that the soils are rich in clay and have the kankar layer at 1 to 3 feet. The slopes are said to run about 1 to 2 percent. Some of the soils have some salt. They hope to build bunds and level between them. I think he realizes, but I emphasize anyway, that this will be a very tricky business. Any leveling operation that brings the kankar closer than 12 inches will produce an unfit soil. Doubtless they will need to provide reasonably deep drainage ditches. I hope very much that they can get a good expert in this area before they spend much money on it. From what he says they will also need some gypsum treatments with flooding and heavy manuring. This project could turn out very badly.

They talk about a deficiency on the citrus. Zinc helps some but no treatments have cured it. Since nematodes here are said to attack barley and wheat they may be responsible.

So now I have to go and look at the orchards where they have several kinds of fruit. Grapes do well and the mangoes are beautiful. Much of the citrus, especially the malta oranges, have completely died and the grapefruit look only fair. Although zinc and iron, and perhaps other nutrients, may be involved I strongly suspect either nematodes or a virus "dieback." Only the citrus show these mottled leaves. It apparently has not occurred to anyone here to examine the roots of these orange trees. I suggest that they dig a trench tangent to the trunk of one of these bad trees and study the root system. In the meantime I would plant mangoes instead of citrus.

We leave at 10:15 and go to the Department of Agriculture where I meet the Director, Mr. Samarath Raj, and some of his staff.

He points out that Rajasthan was made by combining princely states in 1949. These states had little agricultural service and the Department has been organized only since 1952. They have undertaken organized soil and water conservation work for only a bit more than a year. So far they have made their goal in the second 5-year plan. Besides increased water from wells they hope to irrigate 550,000 acres in the Kota area and 3,300,000 with water from Bhakra Dam. He emphasizes the need for tractor-drawn plows and bulldozers to prepare the land for irrigation, especially at Kota. "But", he says, "we have no foreign exchange." I get the impression that somehow I am expected to promise them help from the U. S!

So now I have to go and look at the orchards where they have several kinds of fruit. Grapes do well and the mangoes are beautiful. Much of the citrus, especially the Malta oranges, have completely died and the grapefruit look only fair. Although zinc and iron, and perhaps other nutrients, may be involved I strongly suspect either nematodes or a virus "dieback." Only the citrus show these mottled leaves. It apparently has not occurred to anyone here to examine the roots of these orange trees. I suggest that they dig a trench tangent to the trunk of one of these bad trees and study the root system. In the meantime I would plant mangoes instead of citrus.

We leave at 10:15 and go to the Department of Agriculture where I meet the Director, Mr. Samaratilaka, and some of his staff. He points out that Rajasthan was made by combining princely states in 1949. These states had little agricultural service and the Department has been organized only since 1952. They have undertaken organized soil and water conservation work for only a bit more than a year. So far they have made their goal in the second 5-year plan. Besides increased water from wells they hope to irrigate 550,000 acres in the Kota area and 3,300,000 with water from Bhakra Dam. He emphasizes the need for tractor-drawn plows and bulldozers to prepare the land for irrigation, especially at Kota. "But," he says, "we have no foreign exchange." I get the impression that somehow I am expected to promise them help from

I discuss with him a law something like the one proposed in Mysore State for building bunds when the majority of the village vote for it. If any cultivators do not go ahead with their part of the scheme, the Department would build the bunds and charge the cost against the land. The same rule should apply on maintenance. He thinks they might get such a law where 75 percent of the vote was favorable.

We discuss some of the needs for increased food production:

1. First of all he emphasizes soil and water conservation.

He wants to go ahead with encouragement of field bunding even though it is not done on the contour and there is no subsidy with the idea that this is better than nothing. But I point out that I'm afraid that once cultivators have done this they will be reluctant to make new bunds on the contour. I also point out the great advantage of coordination with land reconsolidation wherever contour bunding, irrigation, or drainage is involved. He said that he had seen this part of my 1958 report and they were working toward that end. Then he reminds his secretary to prepare another memo on it!

2. He emphasizes the importance of changing from broadcast to line sowing.

3. They are emphasizing the need for weed control.

4. The Department is now supplying better implements including plows, seeders, and cultivators.

5. All the cultivators are now required to join together for insect and disease control. If some fail the work is done by the Society or the Department and charged against the land.

I discuss with him a law something like the one proposed in Mysore State for building bunds when the majority of the village vote for it. If any cultivators do not go ahead with their part of the scheme, the Department would build the bunds and charge the cost against the land. The same rule should apply on maintenance. He thinks they might get such a law where 75 percent of the vote was favorable.

We discuss some of the needs for increased food production:

1. First of all he emphasizes soil and water conservation.

He wants to go ahead with encouragement of field bunding even though it is not done on the contour and there is no subsidy with the idea that this is better than nothing. But I point out that I'm afraid that once cultivators have done this they will be reluctant to make new bunds on the contour. I also point out the great advantage of coordination with land reclamation wherever contour bunding, irrigation, or drainage is involved. He said that he had seen this part of my 1958 report and they were working toward that end. Then he reminds his secretary to prepare another memo on it!

2. He emphasizes the importance of changing from broadcast to

line sowing.

3. They are emphasizing the need for weed control.

4. The Department is now supplying better implements including

plows, seeders, and cultivators.

5. All the cultivators are now required to join together for

insect and disease control. If some fail the work is done by the

Society or the Department and charged against the land.

6. Fertilizers were used very little until recently. Now they have been pushed to the point that demand exceeds supply; so it is necessary to concentrate on compost and green manure. In the drier areas cultivators are reluctant to sow green manures because of a lack of water.

7. As a result of land reform some of the common land is used for grazing. Some of that taken from the old landlords is going to the landless. On part of it they hope to settle the nomadic people in areas where they can get good wells. They have not considered a law to license herdsmen on public land.

We then get into the cars and hurry over to another building to meet the busy Secretary of Agriculture, Mr. Chem Chand.

He says they are now introducing service cooperative societies for farming people. The excess land resulting from land ceilings will be under cooperative societies but no decision has been taken yet on organization in joint farms or in some other way. The land ceilings will be different in different areas depending on productivity. Exemptions will be made for mechanized farms and "livestock" farms. Some land may be used for supplementing small holdings, perhaps, but precise plans are not formulated.

Most villages have credit societies. In large villages they plan to have one multiple-purpose society but for small ones they expect to have a union of several according to pattern No. 2 of the Report on Cooperative Policy (New Delhi January 1959).

6. Fertilizers were used very little until recently. Now

they have been pushed to the point that demand exceeds supply;

so it is necessary to concentrate on compost and green manure.

In the drier areas cultivators are reluctant to sow green manures

because of a lack of water.

7. As a result of land reform some of the common land is used

for grazing. Some of that taken from the old landlords is going to

the landless. On part of it they hope to settle the nomadic people

in areas where they can get good wells. They have not considered

a law to license herdsmen on public land.

We then get into the cars and hurry over to another building

to meet the busy Secretary of Agriculture, Mr. Chen Chaud.

He says they are now introducing service cooperative societies

for farming people. The excess land resulting from land ceilings will

be under cooperative societies but no decision has been taken yet on

organization in joint farms or in some other way. The land ceilings

will be different in different areas depending on productivity.

Exemptions will be made for mechanized farms and "livestock" farms.

Some land may be used for supplementing small holdings, perhaps,

but precise plans are not formulated.

Most villages have credit societies. In large villages they

plan to have one multiple-purpose society but for small ones they

expect to have a union of several according to pattern No. 2 of

the Report on Cooperative Policy (New Delhi January 1959).

They say that about two-thirds of the State is in blocks but they will have all of it in blocks by the end of the third 5-year plan.

The Secretary says that the blocks have helped a great deal to make the villagers improvement minded. The Chief Secretary acts as chairman of a coordinating committee including all department heads and a representative from Finance. Some representative from the Finance Department is on all subcommittees. They are assisted further in coordination by the fact that the Minister of Agriculture is also Minister of Cooperation, of Forests, and of Public Works. The Secretary says that he has done a lot to improve the work and morale of the Public Works Department. They also have a cabinet subcommittee for coordination of irrigation development and special ones for each project.

The Secretary said that in the beginning of Community Development, too much of the money of the blocks went for buildings but that more of it now is going to agriculture and they have a more ^{nearly} balanced program.

At 11:30 we collect the Secretary along with the Director and hurry over to the Legislative Assembly building to see the Minister. The Assembly is in session and debating matters of concern to the Department of Agriculture so I shall be able to see him for only a few moments.

We drive some distance into the old part of the city - "the pink city" built from the red sandstone. The buildings and the shops are very colorful, very crowded, and a trifle unclean. We

They say that about two-thirds of the State is in blocks but they will have all of it in blocks by the end of the third 5-year plan.

The Secretary says that the blocks have helped a great deal to make the villagers improvement minded. The Chief Secretary acts as chairman of a coordinating committee including all departments heads and a representative from Finance. Some representative from the Finance Department is on all subcommittees. They are assisted further in coordination by the fact that the Minister of Agriculture is also Minister of Cooperation, of Forests, and of Public Works. The Secretary says that he has done a lot to improve the work and morale of the Public Works Department. They also have a cabinet subcommittee for coordination of irrigation development and special ones for each project.

The Secretary said that in the beginning of Community Development, too much of the money of the blocks went for buildings but that more of it now is going to agriculture and they have a more balanced program nearly. At 11:30 we collected the Secretary along with the Director and hurry over to the Legislative Assembly building to see the Minister. The Assembly is in session and debating matters of concern to the Department of Agriculture so I shall be able to see him for only a few moments.

We drive some distance into the old part of the city - "the pink city" built from the red sandstone. The buildings and the shops are very colorful, very crowded, and a little unclear. We

go through a beautiful arch and into the palace. I step into the Assembly Hall for a moment and listen to the debate. (I don't know what it is about because the eloquent speaker talks in Hindi.)

Then I am ushered into a small room to meet the Minister, Shri Nathur Ram Mirdha. He is a nice appearing man and speaks well.

He says that they cannot solve the overgrazing by legislation. The people are not ready for it. They must make a gradual approach. Fencing will be necessary and it is very costly; and they shall have to have officers to administer any licensing scheme.

He expects joint farming to begin on the government lands. Then small holders will pool their holdings. These results will be so good that then the larger landowners will want to pool theirs in cooperative farming. So the final result, he says, will depend on how well we do in the beginning. Land is now being allotted to the landless in cooperative societies where there can be irrigation.

I ask how they plan to keep the accounts and handle the management? He says they don't know now how the income will be divided. But he says these are all technical questions of administration that will be easily solved when people come together voluntarily. He visualizes different systems in different societies.

I am not sure whether the Minister realizes all of the many difficulties involved in joint farming and collectives. Either he is just talking or covering up, or else he is a bit naive.

We talk about price supports at the cultivator's market, godowns, and reserve stocks as explained earlier in these notes. He says that he is strong for such a program and feels that price supports and

go through a beautiful arch and into the palace. I step into the Assembly Hall for a moment and listen to the debate. (I don't know what it is about because the eloquent speaker talks in Hindi.) Then I am ushered into a small room to meet the Minister, Shri Nathur Ram Mirdha. He is a nice appearing man and speaks well. He says that they cannot solve the overgrazing by legislation. The people are not ready for it. They must make a gradual approach. Fencing will be necessary and it is very costly; and they shall have to have officers to administer any licensing scheme. He expects joint farming to begin on the government lands. Then small holders will pool their holdings. These results will be so good that then the larger landowners will want to pool theirs in cooperative farming. So the final result, he says, will depend on how well we do in the beginning. Land is now being allotted to the landless in cooperative societies where there can be irrigation. I ask how they plan to keep the accounts and handle the management? He says they don't know now how the income will be divided. But he says these are all technical questions of administration that will be easily solved when people come together voluntarily. He visualizes different systems in different societies. I am not sure whether the Minister realizes all of the many difficulties involved in joint farming and collectives. Either he is just talking or covering up, or else he is a bit naive. We talk about price supports at the cultivator's market, godowns, and reserve stocks as explained earlier in these notes. He says that he is strong for such a program and feels that price supports and

the nationalization of wholesale trade are essential.

At 12:20 we take our leave and go back to the Secretariat. As we return, I overhear Mr. D. K. Misra telling the Secretary and Director, "Dr. Kellogg was very much impressed with Dr. Bhatnagar at the Station." The Director and Secretary both agreed that he was a very good man and they would try to promote him! Of course, I got no such impression nor did I so indicate, other than by lack of discourtesy. Now what to do about such statements? I say nothing. We first drop the Secretary and then the Director.

I am back to the hotel, wash, pack, and take my lunch.

All these people I have met today have been very courteous and friendly. I don't believe they know what difficulties they have besides the equipment mentioned several times.

My guides come a little bit late and we leave for some sight-seeing at 1:45. The streets in the old city are very colorful with the red sandstone buildings and the carved and painted arches. There are many people, donkeys, cows, camels, and shops of all kinds in a profusion of color. In several shops people are making saris by the tie-and-dye method. They then swing them out into the street while they dry. Many among the crowds appear to me to lack funds!

From the old city we drive out a way on the road to Delhi. In between the many old temples, cenotaphs, and palaces some people are growing irrigated vegetables and wheat. (K-2801) Near the road is an old "water" palace that once sat in a lake and can now be reached

The nationalization of wholesale trade are essential.

At 12:30 we take our leave and go back to the Secretariat.

As we return, I overhear Mr. D. K. Mitra telling the Secretary

and Director, "Dr. Kallag was very much impressed with Dr. Bhatnagar

at the Station." The Director and Secretary both agreed that he

was a very good man and they would try to promote him! Of course,

I got no such impression nor did I so indicate, other than by lack

of discourtesy. Now what to do about such statements? I say nothing.

We first drop the Secretary and then the Director.

I am back to the hotel, wash, pack, and take my lunch.

All these people I have met today have been very courteous and

friendly. I don't believe they know what difficulties they have

besides the equipment mentioned several times.

My guides come a little bit late and we leave for some sight-

seeing at 1:45. The streets in the old city are very colorful with

the red sandstone buildings and the carved and painted arches. There

are many people, donkeys, cows, camels, and shops of all kinds in a

profusion of color. In several shops people are making earls by the

tie-and-dye method. They then swing them out into the street while

they dry. Many among the crowds appear to me to lack funds!

From the old city we drive out a way on the road to Delhi. In

between the many old temples, cenotaphs, and palaces some people are

growing irrigated vegetables and wheat. (K-2801) Near the road is

an old "water" palace that once sat in a lake and can now be reached



K-2801. February 27, 1959. Just north of Jaipur.
Group of temples and cenotaphs.



K-2802. February 27, 1959. Jaipur.
Amber Palace and old fortifications.

K-2801. February 27, 1959. Just north of Jaipur.
Group of temples and cenotaphs.

K-2802. February 27, 1959. Jaipur.
Amber Palace and old fortifications.

only by boat during the monsoon period. We continue on past many of these old buildings. We see the ruins of old fortresses and stone walls on the hills.

Where we turn off the main road toward Amber Palace, I see a group of elephants for hire. They take people up the steep slopes and return for Rs 30.

The Amber Palace sets on a high hill and is surrounded by old fortifications on still higher hills. (K-2802) This was the old capital of Jaipur some 5 or 6 centuries ago.

It's a long, hard walk up to the Palace in the hot afternoon sun. From the top I can look beyond to the still older site of the city of Jaipur. (K-2803)

We go inside and look at many of the interesting rooms. Several are decorated with glass and mica and some with tiny curved mirrors. There are many beautiful columns of carved marble.

As far as I'm concerned a little of this goes a long way. On the way back down the hill I meet a man playing nicely on a violin that he has made from a coconut shell, some pieces of bamboo, and horse hair.

We drive back through the city and around some of the gardens and then for tea with the Director of Agriculture and his staff.

The Director says they are now training their block officers in agriculture and promoting some of the agriculturists to block administrators. He thinks these block officers have done a good job in getting people moving toward improvement.

only by boat during the monsoon period. We continue on past many of these old buildings. We see the ruins of old fortresses and stone walls on the hills.

Where we turn off the main road toward Amber Palace, I see a group of elephants for hire. They take people up the steep slopes and return for Rs 30.

The Amber Palace sits on a high hill and is surrounded by old fortifications on still higher hills. (K-2802) This was the old capital of Jaipur some 5 or 6 centuries ago.

It's a long, hard walk up to the Palace in the hot afternoon sun. From the top I can look beyond to the still older site of the city of Jaipur. (K-2803)

We go inside and look at many of the interesting rooms. Several are decorated with glass and mica and some with tiny curved mirrors.

There are many beautiful columns of carved marble.

As far as I'm concerned a little of this goes a long way. On the way back down the hill I meet a man playing nicely on a violin that he has made from a coconut shell, some pieces of bamboo, and horse hair.

We drive back through the city and around some of the gardens and then for tea with the Director of Agriculture and his staff.

The Director says they are now training their block officers in agriculture and promoting some of the agriculturists to block administrators. He thinks these block officers have done a good job in getting people moving toward improvement.



K-2803. February 27, 1959. Jaipur. View from Amber Palace towards still older site of Jaipur.

K-2803. February 27, 1959. Jaipur. View from Amber
Palace towards still older side of Jaipur.

About 5:00 p.m. we drive out to the airport over this sandy plain. The high bunds around the fields are partly grassed. Nearly all the fields are leveled and some are irrigated.

We reach the airport about 5:25 and wait. Later the bus comes from the city and I check in. My guides see me off and I am in the air for Delhi at 6:11 p.m.

Just as the sun goes down we pass over the city and the hills beyond. I discover that I'm very tired.

At first perhaps one-third of the fields are irrigated. There are large areas of hilly rocky soil and nearly barren braided stream courses. Some of the colluvial slopes in front of the hills are very badly gullied, mainly because of the overgrazing. As we go on the percentage of hilly, rocky land increases. It grows dark so I read over what I have written and hope that Mommy can read it.

I am down in Delhi at about 7:04. Mommy is there with the driver to meet me and we are soon back at the hotel. Then dinner, notes, bake my back, and to bed.

About 5:00 p.m. we drive out to the airport over this sandy plain. The high bunds around the fields are partly grassed. Nearly all the fields are leveled and some are irrigated. We reach the airport about 5:25 and wait. Later the bus comes from the city and I check in. My guides see me off and I am in the air for Delhi at 6:11 p.m.

Just as the sun goes down we pass over the city and the hills beyond. I discover that I'm very tired. At first perhaps one-third of the fields are irrigated. There are large areas of hilly rocky soil and nearly barren brided stream courses. Some of the colluvial slopes in front of the hills are very badly gullied, mainly because of the overgrazing. As we go on the percentage of hilly, rocky land increases. It grows dark so I read over what I have written and hope that Mommy can read it. I am down in Delhi at about 7:04. Mommy is there with the driver to meet me and we are soon back at the hotel. Then dinner, notes, make my pack, and to bed.

February 28

Tea at 6:45, breakfast, and work on notes.

At 10:15 I leave with Dr. Parker for Dr. Uppal's office in the Ministry of Food and Agriculture for a conference on plans for TCM help on soil conservation and soil survey. This is a follow-up of our previous conference already recorded. (February 13, 1959). Dr. Parker and Dr. Basu had worked out a program. On several points Dr. Uppal is inclined to raise questions but a plan is finally adopted for recommendations to the Ministry.

About 12:00 noon I return. Except for a brief trip to the city, Mommy and I work on notes all the afternoon and early evening.

Then bake, read a while, and go to bed.

Ap. XVIII, XX

February 28

Ten at 6:45, breakfast, and work on notes.

At 10:15 I leave with Dr. Parker for Dr. Uppal's office in

the Ministry of Food and Agriculture for a conference on plans

for TCM help on soil conservation and soil survey. This is a

follow-up of our previous conference already recorded. (February 13,

1959). Dr. Parker and Dr. Basu had worked out a program. On

several points Dr. Uppal is inclined to raise questions but a plan

is finally adopted for recommendations to the Ministry.

About 12:00 noon I return. Except for a brief trip to the city,

Mommy and I work on notes all the afternoon and early evening.

Then bake, read a while, and go to bed.

Ap. XVII, XX

March 1 (Sunday)

In the morning I write up a summary report of my visit to Rajasthan. Between 12:00 noon and 1:00 p.m. a few of us have a brief conference with Mr. H. M. Patel, a former Secretary of Agriculture in GOI (Government of India). (Later he was Principal Secretary of Finance, which post he left a year ago during the insurance scandals.)

We discuss the matter of support prices, local godowns, and reserve stocks described earlier in these notes. He does not believe that complete nationalization of the wholesale trade is necessary. He thinks that traders can be licensed and that the selling can be done through cooperative societies. Yet later he agrees that some societies are not now honestly operated!

He agrees that good godowns would be needed; that trained government officers would be needed to grade the grain; and that some time would be required - all about as Chief Secretary Rao of Bangalore had outlined to me. He further agrees that price supports should be fairly low, to prevent disaster prices to the cultivators and announced well before planting time.

He suggests that the American stocks be kept in India but in American hands to be released to the GOI if needed. He thinks their presence would give people assurance against famine and keep traders from raising prices. (I still think there should be a ceiling, if it can be administered, partly to reassure the non-rural people.)

March 1 (Sunday)

In the morning I write up a summary report of my visit to Rajasthan. Between 12:00 noon and 1:00 p.m. a few of us have a brief conference with Mr. H. M. Patel, a former Secretary of Agriculture in GOI (Government of India). (Later he was Principal Secretary of Finance, which post he left a year ago during the insurance scandals.)

We discuss the matter of support prices, local godowns, and reserve stocks described earlier in these notes. He does not believe that complete nationalization of the wholesale trade is necessary. He thinks that traders can be licensed and that the selling can be done through cooperative societies. Yet later he agrees that some societies are not now honestly operated!

He agrees that good godowns would be needed; that trained government officers would be needed to grade the grain; and that some time would be required - all about as Chief Secretary Rao of Bangalore had outlined to me. He further agrees that price supports should be fairly low, to prevent disaster prices to the cultivators and announced well before planting time.

He suggests that the American stocks be kept in India but in American hands to be released to the GOI if needed. He thinks their presence would give people assurance against famine and keep traders from raising prices. (I still think there should be a ceiling, if it can be administered, partly to reassure the non-rural people.)

Later he says that as a "selling" point for the scheme, the government can be told that it would work either way, with or without state trading. After it goes into operation, they could then decide on that point.

He stresses: (1) the urgent need for a firm decision; (2) good godowns; (3) no time-killing effort to provide against every circumstance that may arise; and (4) a "planned" speed of 2 to 5 years.

He points out the impracticality of Nehru's slogan: "One village, one cooperative." But he thinks that Nehru can be brought to change his view by careful outlining of the advantages and problems of alternative schemes for strengthening the cooperative societies.

Mr. Patel says that the Community Development program has been "ruined" by speed, which swept in a lot of very poor people and greatly diluted the good early staff. He does not think that the problem of discipline in government service is so bad; but after he discusses it I cannot see in what way it is not about as bad as Secretary Rao told me it was.

Then lunch and back to my notes. After tea time conversation, dinner, and early to bed for an early morning plane to Calcutta.

Later he says that as a "selling" point for the scheme, the

government can be told that it would work either way, with or

without state trading. After it goes into operation, they could

then decide on that point.

He stresses: (1) the urgent need for a firm decision;

(2) good godowns; (3) no time-killing effort to provide against

every circumstance that may arise; and (4) a "planned" speed of

2 to 5 years.

He points out the impracticality of Nehru's slogan: "One

village, one cooperative." But he thinks that Nehru can be brought

to change his view by careful outlining of the advantages and

problems of alternative schemes for strengthening the cooperative

societies.

Mr. Patel says that the Community Development program has been

"ruined" by speed, which swept in a lot of very poor people and

greatly diluted the good early staff. He does not think that the

problem of discipline in government service is so bad; but after

he discusses it I cannot see in what way it is not about as bad

as Secretary Rao told me it was.

Then lunch and back to my notes. After tea time conversation,

dinner, and early to bed for an early morning plane to Calcutta.

March 2

I am up at 5:30 after a wakeful night and an unwell stomach. So I go after my old stand-bys, paregoric and kaolin. Then to the airport, early as usual in India. Dr. Basu comes and we go to the plane at 7:25. We are in the air at 7:40 for Calcutta.

It is most too hazy to see. I refuse breakfast but mix up another batch of paregoric and kaolin. This makes me very sleepy. Basu gives me a file on shifting cultivation. In the report mention is made of "Jhumias", apparently shifting cultivators, "jhum" land, and "jhumming." After reading this I nod.

We are down in Calcutta at 10:30 and are met by D. S. Digar, Soil Correlator; S. K. Mukherjee, Joint Director of Agriculture for Soil Conservation; and G. P. Biswas, soil scientist (Soil Survey, GOI), trained by Dr. Obenshain of Virginia.

At 10:45 with Mukherjee and his driver I leave for the Grand Hotel. It is warm (over 90) hazy, and quite humid. The streets are crowded with people, many dirty, some nearly naked, and nearly all low on funds. As we stop for a bus ahead one very dirty fellow comes up and shouts at me in Bengali. I have no idea what he is saying but it is not friendly. We drive on. Even now many lie asleep on the streets. And so do many cows, even in the heart of the city.

I get my room at 11:30 and rest a bit, in spite of the fact, according to the receptionist, that no reservations had been made!

March 2

I am up at 5:30 after a wakeful night and an unwell stomach.

So I go after my old stand-by, paragoric and kaolin. Then to the airport, early as usual in India. Dr. Basu comes and we go to the plane at 7:25. We are in the air at 7:40 for Calcutta.

It is most too hazy to see. I refuse breakfast but mix up

another batch of paragoric and kaolin. This makes me very sleepy.

Basu gives me a file on shifting cultivation. In the report mention

is made of "Jhumias", apparently shifting cultivators, "Jhum" land,

and "Jhumming". After reading this I nod.

We are down in Calcutta at 10:30 and are met by D. S. Dagar.

Soil Correlator; S. K. Mukherjee, Joint Director of Agriculture

for Soil Conservation; and G. P. Bhowa, soil scientist (Soil Survey,

GOI), explained by Dr. Oberhauser of Virginia.

At 10:45 with Mukherjee and his driver I leave for the Grand

Hotel. It is warm (over 90) hazy, and quite humid. The streets

are crowded with people, many dirty, some nearly naked, and nearly

all low on funds. As we stop for a bus ahead one very dirty fellow

comes up and shouts at me in Bengali. I have no idea what he is

saying but it is not friendly. We drive on. Even now many lie

asleep on the streets. And so do many cows, even in the heart of

the city.

I get my room at 11:30 and rest a bit, in spite of the fact,

according to the receptionist, that no reservations had been made!



Then I realize that when I took out my medicine on the plane, I had to remove the canteen. I forgot to put it back so it was left behind - poor canteen. Although I have a bit of a headache, the stomach seems to be quiet.

After a light lunch I feel better, but weak and tired.

At 2:00 p.m. Mr. K. S. Banerjee comes for me. He says he is a special agricultural officer on a sisal planting scheme. He says that the soils are pH 4.8 to 5.3. I ask whether the sisal does not respond to lime on such soils? "No", he says, "sisal does not need lime." I tell him that is strange because I've seen good results in the Congo on "lateritic" soils. Then he says, "Well, it might be, I really know nothing about it".'

We come to the office of the Director of Agriculture, Shri H. K. Nandi. We just start to talk and he tells me only that one-third of West Bengal is organized in Community Development blocks and that they are planning a special station for soil conservation and dry farming, when I am taken to the Minister of Agriculture, Dr. Rafivddin Ahmed. After briefly explaining my purpose he goes ahead:

"In any program we undertake we must take the people along. We have full freedom of speech. We don't want the system in (Red) China, but they have done very well. Here, because of the freedom to speak untruthfully, the opposition parties obstruct our good programs, including schemes for the settlement of the refugees.

"Because of the great shortage of fertilizers, we will need to emphasize compost (we have appointed compost officers), canal sludge, and green manuring.

Then I realize that when I took out my medicine on the plane, I had to remove the canteen. I forgot to put it back so it was left behind - poor canteen. Although I have a bit of a headache, the stomach seems to be quiet.

After a light lunch I feel better, but weak and tired. At 2:00 p.m. Mr. K. S. Banerjee comes for me. He says he is a special agricultural officer on a special planning scheme. He says that the soils are pH 4.8 to 5.3. I ask whether the soil does not respond to lime on such soils? "No", he says, "soil does not need lime. I tell him that is strange because I've seen good results in the Congo on "laccitic" soils. Then he says, "Well, it might be, I really know nothing about it!"

We come to the office of the Director of Agriculture, Sri H. K. Nandi. We just start to talk and he tells me only that one-third of West Bengal is organized in Community Development blocks and that they are planning a special station for soil conservation and dry farming, when I am taken to the Minister of Agriculture, Dr. Raviindran. Ahmed. After briefly explaining my purpose he goes ahead:

"In any program we undertake we must take the people along. We have full freedom of speech. We don't want the system in (Red) China, but they have done very well. Here, because of the freedom to speak untruthfully, the opposition parties obstruct our good programs, including schemes for the settlement of the refugees. "Because of the great shortage of fertilizers, we will need to emphasize compost (we have appointed compost officers), canal sludge, and green manuring.

"We need irrigation but the DVC dams give irrigation water only in the monsoon period when we don't need it. They save nearly all the stored water for power production during the dry season."

He emphasizes the need for price supports, on the low side, at local godowns. His views are apparently similar to those given me by Chief Secretary Rao at Bangalore.

But he says, by far the greatest trouble is that existing laws are not enforced. They now have a State law to support the price of paddy at about 11 to 14 rupees per maund, depending on its quality. But the law is not enforced. Many cultivators and traders sell clandestinely outside the market. This year they produced 40 lakh tons of rice in West Bengal. They need 46 lakh tons. So they need some from the outside. But traders have hidden away the stocks. If one goes to buy at the stated market price, there is no rice. But you offer a bit more and it is delivered at your door through the illegal black market, simply because the laws are not enforced. "And", he says, "Nehru talks about hanging the black marketeers at the nearest lamp post. Of course, they should be hanged. But I told Nehru himself that he couldn't or wouldn't do it."

He says State trading is essential. He says the laws are not enforced because people lack discipline, people both in and outside of government. (This is true all over India. Gandhi, Nehru, and the others taught their people civil disobedience by oratory and example for years. Of course, this was against the British. But it was the government, and many Indian people still disobey the

"We need irrigation but the DVC dams give irrigation water

only in the monsoon period when we don't need it. They save nearly all the stored water for power production during the dry season."

He emphasizes the need for price supports, on the low side, at local godowns. His views are apparently similar to those given me by Chief Secretary Rao at Bangalore.

But he says, by far the greatest trouble is that existing laws are not enforced. They now have a State law to support the price of paddy at about 11 to 12 rupees per maund, depending on its quality.

But the law is not enforced. Many cultivators and traders sell clandestinely outside the market. This year they produced 40 lakh tons of rice in West Bengal. They need 45 lakh tons. So they need

some from the outside. But traders have hidden away the stocks.

If one goes to buy at the stated market price, there is no rice.

But you offer a bit more and it is delivered at your door through the illegal black market, simply because the laws are not enforced.

"And", he says, "Nehru talks about hanging the black marketers at

the nearest lamp post. Of course, they should be hanged. But I

told Nehru himself that he couldn't or wouldn't do it."

He says State trading is essential. He says the laws are not enforced because people lack discipline, people both in and outside of government. (This is true all over India. Gandhi, Nehru, and the others taught their people civil disobedience by oratory and example for years. Of course, this was against the British. But it was the government, and many Indian people still disobey the

government - now their own government, to be sure; but many do not feel themselves a part of it and continue the old habits taught by Gandhi in different ways and for different reasons.)

He says they have little actual starvation but that many of the people fail to get three good meals a day and thus cannot work effectively. "In the planning, agriculture should have come first. There are some 32 lakhs of refugees from East Pakistan. But they are unfed and cannot work. First these people should have food, given to them if necessary. But now they are all against the government. Delhi is obsessed by the "private sector" for steel and all that. But look what China has done: they made railways out of pig iron from cottage industries. We could do the same."

He says that only 2.4 million people out of 350 million in India pay income tax. Only 24 families pay the highest surtax; and they have much too much to say about how things are done. "I must feed everybody," he says, "if we expect to get the votes."

"Our people," he goes on to say "are not cooperative-minded like the Scandinavians. The laws in this State on cooperative societies were passed in 1928 and are not adequate."

Joint farming is gaining ground he thinks. But it only works well where owners maintain their individual ownerships and share the harvests according to the land they contribute to the scheme and the work they do.

Then at 3:00 p.m. I go to see the Secretary of Agriculture, Shri S. N. Roy.

Government - now their own government, to be sure; but many do not feel themselves a part of it and continue the old habits taught by Gandhi in different ways and for different reasons.)

He says they have little actual starvation but that many of the people fail to get three good meals a day and thus cannot work effectively. "In the planning, agriculture should have come first. There are some 32 lakhs of refugees from East Pakistan. But they are unfed and cannot work. First these people should have food, given to them if necessary. But now they are all against the Government. Delhi is obsessed by the "private sector" for steel and all that. But look what China has done: they made railways out of pig iron from cottage industries. We could do the same."

He says that only 2.4 million people out of 350 million in India pay income tax. Only 24 families pay the highest surtax; and they have much too much to say about how things are done. "I must feed everybody," he says, "if we expect to get the votes."

"Our people," he goes on to say "are not cooperative-minded like the Scandinavians. The laws in this State on cooperative societies were passed in 1928 and are not adequate."

Joint farming is gaining ground he thinks. But it only works well where owners maintain their individual ownerships and share the harvests according to the land they contribute to the scheme and the work they do.

Then at 3:00 p.m. I go to see the Secretary of Agriculture.

Shri S. N. Roy.

He says that Community Development is working out well. It is giving the village people enthusiasm. Then he gives me a long speech about how people in the United States take local responsibility. The purpose of the Community Development Program is to bring this about in India.

West Bengal has had village workers as junior agricultural assistants for some time. The organization is about as follows:

Department of Agriculture

(System outside blocks)

(System within blocks)

District Agricultural Officer

District Agricultural Officer

Subdivision Agricultural Officer

Block Agricultural Extension Officer

(Many more blocks than subdivisions in a district)

Thana (Police Station)

Agricultural inspectors*

Union (Junior) Agricultural Assistants* = Village-level workers*

*Less than B.S. training; some are not even diploma holders.

He says that the British rulers did not help the people; but now they must have a welfare state.

He says that India cannot double production because of undependable rains! Then he gives me a lecture on the wonderful land-grant colleges of the United States. He insists that these institutions do all the extension and research! (He had been at the University of Missouri recently and Missouri has the TCM contract here!!) It is difficult to get him to listen to the truth. Then he says perhaps they could double agricultural production in 25 years and that he expects a 50 percent increase at the end of the Third (5-year) Plan!

He says that Community Development is working out well. It is giving the village people enthusiasm. Then he gives me a long speech about how people in the United States take local responsibility. The purpose of the Community Development Program is to bring this about in India.

West Bengal has had village workers as junior agricultural assistants for some time. The organization is about as follows:
Department of Agriculture

- (System outside blocks)
- (System within blocks)
- District Agricultural Officer
- Subdivision Agricultural Officer
- Block Agricultural Extension Officer
- (Many more blocks than subdivisions in a district)
- Thana (Police Station)
- Agricultural inspectors*
- (Union) (Junior) Agricultural Assistants* = Village-level workers*
- *Less than B.S. training; some are not even diploma holders.

He says that the British rulers did not help the people; but now they must have a welfare state.

He says that India cannot double production because of unproductive rains! Then he gives me a lecture on the wonderful land-grant colleges of the United States. He insists that these institutions do all the extension and research! (He had been at the University of Missouri recently and Missouri has the TCM contract here!!) It is difficult to get him to listen to the truth. Then he says perhaps they could double agricultural production in 25 years and that he expects a 50 percent increase at the end of the Third (5-year) Plan!

(He cannot even listen long enough to get a question clearly in mind!)

He says that irrigation is their greatest need. With water they could double production. Now irrigation fails because of poor rains in the catchment areas and, in the DVC area, because they hold back the water in the dry season for power.

The Secretary says that second after irrigation comes fertilizers. On seeds, he says that at the end of the Second Plan "West Bengal will be saturated with good seeds!" (I wonder!)

The Joint Director for Soil Conservation points out the great need for research to permit precise planning and control "as in the California fruit orchards."

The Secretary says that not much is being done about the consolidation of scattered holdings, partly because they have not finalized their plan for land reforms and ceilings. He says that now they have a ceiling of 25 acres for one man. He says only tea gardens are exempt. I ask, "Does this mean 'standard' acres?" The answer is "Yes." Then I ask for the definition of a standard acre and he replies, "A certain number of square feet." I ask about relative productivity but he insists that productivity per acre and whether irrigated or dryland is not considered. But the landlord can choose the best 25 acres to keep. Dr. Basu asks if I had found a similar rule in any other State and I reply that all the others take account of relative productivity. Then the Secretary says, "Well, maybe we do here. This matter is handled by the Revenue Department

(He cannot even listen long enough to get a question clearly in mind!)

He says that irrigation is their greatest need. With water they could double production. Now irrigation fails because of poor rains in the catchment areas and, in the DVC area, because they hold back the water in the dry season for power. The Secretary says that second after irrigation comes ferti-

lizers. On seeds, he says that at the end of the Second Plan "West Bengal will be saturated with good seeds!" (I wonder!) The Joint Director for Soil Conservation points out the great need for research to permit precise planning and control "as in the California fruit orchards."

The Secretary says that not much is being done about the consolidation of scattered holdings, partly because they have not finalized their plan for land reforms and ceilings. He says that now they have a ceiling of 25 acres for one man. He says only tea gardens are exempt. I ask, "Does this mean 'standard' acres?" The answer is "yes." Then I ask for the definition of a standard acre and he replies, "A certain number of square feet." I ask about relative productivity but he insists that productivity per acre and whether irrigated or dryland is not considered. But the landlord can choose the best 25 acres to keep. Dr. Basu asks if I had found a similar rule in any other State and I reply that all the others take account of relative productivity. Then the Secretary says, "Well, maybe we do here. This matter is handled by the Revenue Department

and I know very little about it!!" I fear that coordination is hopelessly lacking here. Apparently the Secretary knows about as much about West Bengal as he does the United States!

We take our leave. It is planned that Mr. K. S. Banerjee will pick me up at the Grand Hotel at 8:00 a.m. tomorrow and take me to the railway station.

I am taken in to meet the Chief Conservator of Forests, Shri V. S. Rao, for a few moments. He says that the problem of fuel for cultivators here is largely one of tradition. The cultivators like cow-dung cakes better than wood and use them even where fuel wood is abundant. He says that he already has responsibilities for rehabilitating 118 square miles of derelict forest where soil erosion is going on and he intends to concentrate there. It is very hard, he says, to arrange cooperation in other areas. "If they will invite me in under a workable scheme, of course I will cooperate. But agriculturists work to cut trees, not plant them."

I am back at the hotel a little after 5:00 p.m., write to Mommy, take tea, and work on my notes.

About 7:45 I have dinner. The Air India office has found my canteen and I have it back. Very good! Read for a while and early to bed.

and I know very little about it!!" I fear that coordination is

hopelessly lacking here. Apparently the Secretary knows about

as much about West Bengal as he does the United States!

We take our leave. It is planned that Mr. K. S. Banerjee will

pick me up at the Grand Hotel at 8:00 a.m. tomorrow and take me to

the railway station.

I am taken in to meet the Chief Conservator of Forests, Shri

V. S. Rao, for a few moments. He says that the problem of fuel for

cultivators here is largely one of tradition. The cultivators like

cow-dung cakes better than wood and use them even where fuel wood

is abundant. He says that he already has responsibilities for

rehabilitating 118 square miles of denuded forest where soil erosion

is going on and he intends to concentrate there. It is very hard,

he says, to arrange cooperation in other areas. "If they will invite

me in under a workable scheme, of course I will cooperate. But

agriculturists work to cut trees, not plant them."

I am back at the hotel a little after 2:00 p.m., write to

Mommy, take tea, and work on my notes.

About 7:45 I have dinner. The Air India office has found my

canteen and I have it back. Very good! Read for a while and early

to bed.

March 3

I am up at 6:30 and leave at 7:50 with Mr. K. S. Banerjee for the railway station. We get on the train and then come Dr. Basu, Mr. Digar, and Mr. B. K. Bhattacharya, Assistant Agricultural Engineer for Irrigation; so we are five. The station is crowded, especially with porters and people selling tea in throw-away earthen pots, fruit, and the like.

The boys show me the soil map and give me a little background of the Kaliaghai Refugee Rehabilitation Block No. 1 (of the Midnapore District). The soil map shows three soil series, all with laterite. Variations within are shown by code for texture, slope, erosion, depth, and stoniness. This coding is not good; but the legend is better controlled than the ones I saw a year ago.

All the soils are said to have murram layers of laterite concretions. In some low places, local alluvium has thickened the layer above the murram. I'm told that the area is undulating and more or less eroded, with some gulleys.

The area is in the upper catchment of the Kaliaghai River, which has water only in the monsoon season. They are planning to settle refugees on the banded soil. Each is supposed to have 3 acres of upland paddy and 3 acres of sisal. A few are there now helping with the projects. This small pilot area will care for 200 families. They hope to enlarge the scheme in this district to 60,000 acres for 10,000 families.

March 3

I am up at 6:30 and leave at 7:50 with Mr. K. S. Banerjee for the railway station. We get on the train and then come Dr. Banerjee, Mr. Dagar, and Mr. B. K. Bhattacharya, Assistant Agricultural Engineer for Irrigation; so we are five. The station is crowded, especially with porters and people selling tea in throw-away earthen pots, fruit, and the like.

The boys show me the soil map and give me a little background of the Kaliahal Refugee Rehabilitation Block No. 1 (of the Midnapore District). The soil map shows three soil series, all with laterite. Variations within are shown by code for texture, slope, erosion, depth, and stoniness. This coding is not good; but the legend is better controlled than the ones I saw a year ago.

All the soils are said to have murrem layers of laterite concretions. In some low places, local alluvium has thickened the layer above the murrem. I'm told that the area is undulating and more or less eroded, with some gullies.

The area is in the upper catchment of the Kaliahal River, which has water only in the monsoon season. They are planning to settle refugees on the bunded soil. Each is supposed to have 3 acres of upland paddy and 3 acres of stall. A few are there now helping with the projects. This small pilot area will care for 200 families. They hope to enlarge the scheme in this district to 60,000 acres for 10,000 families.

This has been derelict soil for some time. With bunding they hope to have some irrigation, but I take it that much of the paddy will be the upland sort.

Our compartment is crowded and the windows have bars; so I will be unable to take pictures. At the last minute I realize I do not have a ticket, only a coupon to buy a ticket. Oh me!

The train leaves about 8:45 a.m. on the Southeastern Line for Kharagpur, about 72 miles slightly south of west. It is sunny, hazy, and already quite warm. As we pass the yards I see some areas covered with wickets, said to be used for the vines that give the betel leaves. To make the "confection" they use some of the nut from the arecanut palm, the red extract from a tree (I believe an Acacia), a little lime, and one of the leaves from this "betel" vine.

We pass some paddy fields (only monsoon crop), bananas, coconuts, pasture grass, vegetables, and useless (for fruit) date palms. (It is very hard to see clearly since the windows are small and have heavy iron bars; and the seats run along the outside so that one faces in.)

We stop at Andul. I see quite a bit of a mixed culture: palms, bananas, papaya, and other fruits, with bamboo in the waste places near pools. The soil is nearly flat. The surface color is brown. The water stands along the grade at 2 to 3 feet below the surface. I suppose this is a comparatively recent alluvium of the Ganges (or Ganga). The main areas here have paddy in the monsoon but where they can irrigate, which is not much, they now have vegetables. The soil is a bit saline and drainage is a serious problem. The large areas of paddy

This has been better soil for some time. With bunding they hope to have some irrigation, but I take it that much of the paddy will be the upland sort.

Our compartment is crowded and the windows have bars; so I will be unable to take pictures. At the last minute I realize I do not have a ticket, only a coupon to buy a ticket. Oh me!

The train leaves about 8:45 a.m. on the Southeastern line for Kharagpur, about 72 miles slightly south of west. It is sunny, hazy, and already quite warm. As we pass the yards I see some areas covered with wickets, said to be used for the vines that give the betel leaves. To make the "connection" they use some of the nut from the arecanut palm, the red extract from a tree (I believe an *Acacia*), a little lime, and one of the leaves from this "betel" vine.

We pass some paddy fields (only monsoon crop), bananas, coconuts, pasture grass, vegetables, and useless (for fruit) date palms. (It is very hard to see clearly since the windows are small and have heavy iron bars; and the seats run along the outside so that one faces in.) We stop at Andal. I see quite a bit of a mixed culture: palms,

bananas, papaya, and other fruits, with bamboo in the waste places near pools. The soil is nearly flat. The surface color is brown. The water stands along the grade at 2 to 3 feet below the surface. I suppose this is a comparatively recent alluvium of the Ganges (or Ganga). The main areas here have paddy in the monsoon but where they can irrigate, which is not much, they now have vegetables. The soil is a bit saline and drainage is a serious problem. The large areas of paddy

stubble are now grazed by cattle. Besides paddy, some jute is grown here also.

This is a very slow train. As we pass Abada-West, the drainage is a bit better. Some fields are being plowed, I suppose for the next paddy crop. My guides say that one-crop paddy here averages 2,400 pounds per acre, while the average for West Bengal is only 1,200 pounds.

Beyond Nalpur are slightly higher man-made terraces with coconuts, mangoes, bananas, and the like. The open paddy fields are a bit wet and give some pasture, mostly for cattle but also for sheep.

We pass Bauria and then Uluberia. Here some are plowing the paddy fields. The slightly higher lands have the mixed cultures dominated by palms. Some of these slightly higher (18 to 30 inches) areas are doubtless remnants of old natural levees and some are banks made from earth and sludge out of ponds and canals. All along the railway grade is a wide shallow ditch, not designed for drainage but only the remains of a long shallow borrow pit for the grade.

This continues past Bagman. The paddy areas are essentially treeless. Beyond Deulti some bunded areas are quite low and suggest the remains from brick-earth removal.

We pass the Rupnarayan River and Kolaghat Station on a high grade. Ahead, the alluvial plain seems a bit older and a trifle higher.

(K-2804; K-2805)

scrub are now grazed by cattle. Besides paddy, some jute is grown here also.

This is a very slow train. As we pass Abada-West, the drainage is a bit better. Some fields are being plowed, I suppose for the next paddy crop. My guides say that one-crop paddy here averages 2,400 pounds per acre, while the average for West Bengal is only 1,200 pounds.

Beyond Halpur are slightly higher man-made terraces with coconuts, mangoes, bananas, and the like. The open paddy fields are a bit wet and give some pasture, mostly for cattle but also for sheep.

We pass Bauria and then Uluberia. Here some are plowing the paddy fields. The slightly higher lands have the mixed cultures dominated by palms. Some of these slightly higher (18 to 30 inches) areas are doubtless remnants of old natural levees and some are banks made from earth and sludge out of ponds and canals. All along the railway grade is a wide shallow ditch, not designed for drainage but only the remains of a long shallow borrow pit for the grade.

This continues past Bagman. The paddy areas are essentially treeless. Beyond Dauli some panded areas are quite low and suggest the remains from brick-earth removal.

We pass the Rupnarayan River and Kolaghat Station on a high grade. Ahead, the alluvial plain seems a bit older and a trifle higher.



K-2804. March 3, 1959. About 30 miles west of Calcutta.
View from train.



K-2805. March 3, 1959. About 32 miles west of Calcutta.
View from train.

K-2804. March 3, 1959. About 30 miles west of Calcutta.
View from train.

K-2805. March 3, 1959. About 32 miles west of Calcutta.
View from train.

We have a long stop at Macheda. What a slow train! Here people sell tea in little throw-away earthen pots for one anna! (About 1.3 cents, U. S.)

The same pattern continues with large areas of paddy and smaller ones of mixed culture. Some of these have small plots of vegetables. Generally, the villages suggest severe poverty. One sees many beggars at all the stations. A few houses have metal or tile roofs but most have walls of sun-dried brick and heavily thatched roofs.

We pass Panskura and Haiur. The soil drainage is a bit better. The plowed paddy fields are lighter brown. The bunds are now higher, say 12 to 20 inches, and the plots smaller. About two-thirds or more are plowed. All crops here are rain-fed and I see few wells. There are quite a few fuel trees near the villages and along major field boundaries and drainageways.

We pass Ballichuk.

This fellow Banerjee turns out to be quite a talker, partly in poor English, partly in Bengali, and often with both together in one sentence. My companions discuss agricultural production, a bit irresponsibly I fear. Digar says they get good results from molybdenum on the old leached soils from alluvium with both groundnuts and the green manure used on paddy.

We pass Jakpur and finally come to Kharagpur at 12:15, some 30 minutes late. Just before reaching the station we pass onto a higher, undulating plain - probably from very old alluvium - with Ground-Water Laterite soils. As we go through the gate they accept

We have a long stop at Macheda. What a slow train! Here people sell tea in little throw-away earthen pots for one anna! (About 1.3 cents, U.S.)

The same pattern continues with large areas of paddy and smaller ones of mixed culture. Some of these have small plots of vegetables. Generally, the villages suggest severe poverty. One sees many beggars at all the stations. A few houses have metal or tile roofs but most have walls of sun-dried brick and heavily thatched roofs.

We pass Panakura and Hatur. The soil drainage is a bit better. The plowed paddy fields are lighter brown. The bunds are now higher, say 12 to 20 inches, and the plots smaller. About two-thirds or more are plowed. All crops here are rain-fed and I see few wells. There are quite a few fuel trees near the villages and along major field boundaries and drainageways.

We pass Balichuk.

This fellow Banerjee turns out to be quite a talker, partly in poor English, partly in Bengali, and often with both together in one sentence. My companions discuss agricultural production, a bit irresponsibly I fear. Dagar says they get good results from molybdenum on the old leached soils from alluvium with both groundnuts and the green manure used on paddy.

We pass Jakpur and finally come to Kharagpur at 12:15, some 30 minutes late. Just before reaching the station we pass onto a higher, undulating plain - probably from very old alluvium - with Ground-Water Laterite soils. As we go through the gate they accept

my coupon for a ticket with only minor grumbling. G. P. Biswas is here and I meet Professor V. S. Ragu, Head, Agricultural Engineering Department of the Indian Institute of Technology, and also Professor A. A. Hakim (agricultural engineering), and Professor of soil science, Dr. B. P. Childyal.

This is a new institute for all India "on the M. I. T. model."

It is very sunny and hot here, well over 100° F. They have 40 to 50 inches of rain, all in summer from July to October.

Suddenly I find that I am to go to a big student dinner tonight, to give a formal address in the morning, and to meet the Director, Dr. S. R. Sen Gupta, immediately! He turns out to be quite a nice but worried little man. After some chit-chat, Dr. Basu and I are taken to a guest house and have our lunch.

(Here the soil is almost flat with laterite not far beneath. It is not a highly productive plain!)

About 2:30 several of us leave in two jeeps for the rehabilitation project area. I meet A. K. Majumder, who is locally in charge of this Kalinghai Project.

Five of us are crowded into one small jeep. We drive generally northwest of the town, through a sprawling second town of railway shop workers whose wages are not high. They live in small attached masonry "huts." Most have a tiny yard in front with a cow.

This old plain has some gentle slopes to drainageways. Where the railway has a deep cut for a long underpass, both walls are

my coupon for a ticket with only minor grumbling. G. P. Biswas is here and I meet Professor V. S. Ragu, Head, Agricultural Engineering Department of the Indian Institute of Technology, and also Professor A. A. Hakim (agricultural engineering), and Professor of soil science, Dr. B. P. Chidyal.

This is a new institute for all India "on the M. I. T. model." It is very sunny and hot here, well over 100° F. They have 40 to 50 inches of rain, all in summer from July to October.

Suddenly I find that I am to go to a big student dinner tonight, to give a formal address in the morning, and to meet the Director, Dr. S. R. Sen Gupta, immediately! He turns out to be quite a nice but worried little man. After some chit-chat, Dr. Basu and I are taken to a guest house and have our lunch.

(Here the soil is almost flat with laterite not far beneath. It is not a highly productive plain!)

About 2:30 several of us leave in two jeeps for the rehabilitation project area. I meet A. R. Majumder, who is locally in charge of this Kalinghat Project.

Five of us are crowded into one small jeep. We drive generally northwest of the town, through a sprawling second town of railway shop workers whose wages are not high. They live in small attached masonry "huts." Most have a tiny yard in front with a cow.

This old plain has some gentle slopes to drainageways. Where the railway has a deep cut for a long underpass, both walls are

solid laterite. We continue on this gently undulating plain of red soil lying over hard, or potentially hard, massive or concretionary laterite. Where the soil has been barren a long time, the very surface has a thin reddish brown crust. Most of the land is nearly derelict and is used for rough grazing, which is very thin indeed. Where the surface soil, or A horizon, is fairly deep the soil is banded for upland paddy. Much of the scrub forest land belongs to the State and I see some now with young sol trees.^{1/}

Out about 6 or 7 miles, part of the soil is gently rolling although most is undulating. The easy lower slopes are banded for upland paddy. On some of these cattle now graze. Part is plowed. A large part of the upper slopes have exposed laterite or only very thin soil over laterite.

At some 12 or 14 miles we turn left from the main road into the undulating project area where I see new contour bunds. (K-2806-2807) Even here there are gaps where private owners do not want the bunds! And without them they can have a little or no crop. Yet the government is paying all costs as demonstration!

Because of the great plenty of cheap labor - and of this West Bengal has very much indeed - most bunds are made by hand, with the earth taken from shallow pits. (K-2970) A very few have been made more or less experimentally with bulldozers. Most of the land here being banded belongs to the government and has been derelict for a long time. But some small tracts are owned in nearby villages. A part may have been donated.

^{1/} Shorea robusta, commonly called either "sol" or "sal."

part may have been donated.

long time. But some small tracts are owned in nearby villages. A being banded belongs to the government and has been derelict for a more or less experimentally with bulldozers. Most of the land here earth taken from shallow pits. (K-2970) A very few have been made Bengal has very much indeed - most bunds are made by hand, with the Because of the great plenty of cheap labor - and of this West ment is paying all costs as demonstration!

And without them they can have a little or no crop. Yet the govern- Even here there are gaps where private owners do not want the bunds! undulating project area where I see new contour bunds. (K-2806-2807) At some 12 or 14 miles we turn left from the main road into the thin soil over laterite.

A large part of the upper slopes have exposed laterite or only very upland paddy. On some of these cattle now graze. Part is plowed, although most is undulating. The easy lower slopes are banded for Out about 6 or 7 miles, part of the soil is gently rolling

belongs to the State and I see some now with young soil trees. 1/ soil is banded for upland paddy. Much of the scrub forest land

indeed. Where the surface soil, or A horizon, is fairly deep the

is nearly derelict and is used for rough grazing, which is very thin

the very surface has a thin reddish brown crust. Most of the land

cretionary laterite. Where the soil has been barren a long time,

red soil lying over hard, or potentially hard, massive or con-

solid laterite. We continue on this gently undulating plain of



K-2806. March 3, 1959. About 15 miles northwest of Kharagpur. New bund on soil with laterite beneath (machine made).



K-2807. March 3, 1959. About 15 miles northwest of Kharagpur. New bund on soil with laterite beneath (hand made).

K-3806. March 3, 1959. About 15 miles northwest
of Kharagpur. New pond on soil with laterite
beneath (machine made).

K-2807. March 3, 1959. About 15 miles northwest
of Kharagpur. New pond on soil with laterite
beneath (hand made).



K-2970. March 3, 1959. 15 miles northwest of Kharagpur.
New bund on soil with laterite beneath. (Man made).

X-2970. March 3, 1959. 12 miles northwest of Kharabpur.
New pond on soil with laterite beneath. (see map).

The bunds generally are 8-feet wide at the base, 2-3/4 feet high, and 1½ feet wide at the top. When completed, simple spillways are made. The costs run about Rs 40 per acre, up to Rs 50 on some slopes. (These seem low to me.) After bunding the fields with the deepest soils (over laterite) will be used for upland paddy and the others for sisal. Some of the poorest soil, and some not so poor, is being planted to sol, cashewnuts, acacia, etc.

We look hurriedly at a soil profile where the surface soil is fairly thick over concretionary laterite that does harden on exposure. The slope is about 1 to 2 percent. (K-2808) I should call this one of the many soils that fall neatly in the group of Ground-Water Laterite soils. As usual, I have only a very few minutes where I should have two hours.

A _p	0 - 6"	Reddish-brown (5YR 4/4) light sandy clay loam. The soil is nearly massive in place but digs out in friable clods. Gradual boundary.
A _B	6 - 19"	Red to yellowish-red (2.5YR to 5YR 4/6) sandy clay loam. The nearly massive soil digs out in firm clods that are fairly easily friable to mixed large and small irregular granular. Gradual lower boundary. (This appears as a secondary weak B horizon within an older fairly deep A associated with the laterite beneath.)
A ₃	19 - 25"	Like the above but somewhat lighter in color and with very faint large mottles. Gradual lower boundary.
B ₁	25 - 30"	Transitional with some concretions.
B ₂	30 - 50"	Yellowish-red (5YR 5/6) massive sandy clay, mottled with firm to hard red (2.5YR 3/6) lateritic concretions. Gradual lower boundary.

The bunds generally are 8-feet wide at the base, 2-3 1/4 feet high, and 1 1/2 feet wide at the top. When completed, simple spillways are made. The costs run about Rs 40 per acre, up to Rs 50 on some slopes. (These seem low to me.) After bunding the fields with the deepest soils (over laterite) will be used for upland paddy and the others for sisal. Some of the poorest soil, and some not so poor, is being planted to soil, cashewnuts, acacia, etc.

We look hurriedly at a soil profile where the surface soil is fairly thick over concretionary laterite that does harden on exposure. The slope is about 1 to 2 percent. (K-2808) I should call this one of the many soils that fall neatly in the group of Ground-Water Laterite soils. As usual, I have only a very few minutes where I should have two hours.

Reddish-brown (2YR 4/4) light sandy clay loam. The soil is nearly massive in place but digs out in friable clods. Gradual boundary.	0 - 6"	A _p
Red to yellowish-red (2.5YR to 2YR 4/6) sandy clay loam. The nearly massive soil digs out in firm clods that are fairly easily friable to mixed large and small irregular granular. Gradual lower boundary. (This appears as a secondary weak B horizon within an older fairly deep A associated with the laterite beneath.)	6 - 19"	A _b
Like the above but somewhat lighter in color and with very faint large mottles. Gradual lower boundary.	19 - 25"	A ₃
Transitional with some concretions.	25 - 30"	B ₁
Yellowish-red (2YR 5/6) massive sandy clay, mottled with firm to hard red (2.5YR 3/6) lateritic concretions. Gradual lower boundary.	30 - 50"	B ₂



K-2808. March 3, 1959. About 18 miles northwest of Kharagpur. Bunds on old Ground-Water Laterite soil.



K-2809. March 3, 1959. About 18 miles northwest of Kharagpur. Cashewnut trees set out in 1956 on soil with laterite beneath.

K-2808. March 3, 1959. About 18 miles northwest of
Kharagpur. Buried on old Ground-Water laterite
soil.

K-2809. March 3, 1959. About 18 miles northwest of
Kharagpur. Cashewnut trees set out in 1956
on soil with laterite beneath.

B₃ 50 - 60+'' A matrix of slightly pinkish, gray (7.5YR 6/2) massive sticky sandy clay (gleyed) with many soft to firm red (2.5YR 4/8) laterite concretions. The soil is moist now in the lower part.

My guides tell me that the B₃ becomes very hard when dry. The second horizon appears as a slight B in the old A. I think the A is genetically related to the laterite beneath, but not the A_B. Possibly the upper part, which has but very few concretions, is drift over the laterite but I am convinced not; otherwise the concretions would be much harder and one would expect either a stoneline or a crust.

I then meet Mr. P. K. Roy, the local forestry officer, who rides with us into a fairly new planted strip on the upper slope some 15 chains wide and 8 miles long. The trees are set in rows about 9 feet apart. Several kinds are used and I photograph the young cashewnut trees, set out in 1956 (K-2809). When 4 years old they expect 200 pounds of nuts per acre. They sell at one to two rupees per pound.

We drive on by recently bunded soil. I see some old jowar stalks, rather poor pigeon peas, and young plantings of sisal on Ground-Water Laterite soils.

We go over some bad roads and onto a demonstration area of protected grassland. There has been a big improvement despite the fact that it is not possible to prevent all illicit grazing. I'm told that the fines are very small and that cases are hard to prove in court. And I suppose these desperate people cannot see why grass should (to them) go to waste while their animals are hungry.

B₃ 50 - 60+
A matrix of slightly pinkish, gray
(7.5YR 6/2) massive sticky sandy clay
(gleyed) with many soft to firm red
(2.5YR 4/8) laterite concretions. The
soil is moist now in the lower part.

My guides tell me that the B₃ becomes very hard when dry. The second horizon appears as a slight B in the old A. I think the A is genetically related to the laterite beneath, but not the A₁. Possibly the upper part, which has but very few concretions, is drift over the laterite but I am convinced not; otherwise the concretions would be much harder and one would expect either a stoneline or a crust. I then meet Mr. P. K. Roy, the local forestry officer, who rides with us into a fairly new planted strip on the upper slope some 15 chains wide and 8 miles long. The trees are set in rows about 9 feet apart. Several kinds are used and I photograph the young cashewnut trees, set out in 1956 (K-2809). When 4 years old they expect 200 pounds of nuts per acre. They sell at one to two rupees per pound. We drive on by recently banded soil. I see some old jawar stalks, rather poor pigeon peas, and young plantings of sisal on Ground-Water laterite soils. We go over some bad roads and onto a demonstration area of protected grassland. There has been a big improvement despite the fact that it is not possible to prevent all illicit grazing. I'm told that the fines are very small and that cases are hard to prove in court. And I suppose these desperate people cannot see why grass should (to them) go to waste while their animals are hungry.

Then I am taken to the usual grass nursery where various grasses are under test for these soils. Molassesgrass does very well, and so does Coastal Bermudagrass from the United States. The best is Pennisetum pedicellatum, a fairly coarse grass about 4 feet tall.

This newly banded reddish Ground-Water Laterite soil will be used for refugee settlement. Each family is to have some 3 acres of upland paddy and 3 acres of sisal. Some 600 acres have been planted to sisal but I suspect that lime may be needed for good growth.

Now the boys insist on a stop for tea while the sun sets. But I really hurry them.

Because a car is reported stuck in the road where it crosses a small stream we return by a round-about way. We pass an old American airfield of World War II.

What a ride! I gather that the B horizons here include (1) concretionary laterite, (2) a little pisolitic laterite, (3) especially soft doughy laterite that will harden, and (4) some slag-like hardened laterite. In fact, all kinds can be seen here.

On some of the treeless, nearly barren upper slopes where the laterite is weak and only partially consolidated, I see some gulleys about 12 inches to 4 feet deep. Here and there on the easy slopes where the soil has not been disturbed recently I see a few cathedral-type termite mounds some 3 to 4 feet high.

In only a few places do I see where bricks are being made from the laterite; yet I pass a loading area near the railway with piles of large laterite slabs.

Then I am taken to the usual grass nursery where various grasses are under test for these soils. Molassesgrass does very well, and so does Coastal Bermudagrass from the United States. The best is

Pennisetum pedicellatum, a fairly coarse grass about 4 feet tall.

This newly banded reddish Ground-Water laterite soil will be used for refugee settlement. Each family is to have some 3 acres of upland paddy and 3 acres of sisal. Some 600 acres have been planted to sisal but I suspect that time may be needed for good growth.

Now the boys insist on a stop for tea while the sun sets. But

I really hurry them.

Because a car is reported stuck in the road where it crosses a small stream we return by a round-about way. We pass an old American airfield of World War II.

What a ride! I gather that the horizons here include (1) con-

cretionary laterite, (2) a little pisolitic laterite, (3) especially soft doughy laterite that will harden, and (4) some slag-like hardened laterite. In fact, all kinds can be seen here.

On some of the treeless, nearly barren upper slopes where the laterite is weak and only partially consolidated, I see some gullies about 12 inches to 4 feet deep. Here and there on the easy slopes where the soil has not been disturbed recently I see a few cathedral-type termite mounds some 3 to 4 feet high.

In only a few places do I see where bricks are being made from the laterite; yet I pass a loading area near the railway with piles of large laterite slabs.

We return to the rest house at 5:50 just as darkness falls. Then tea and notes for my speech for tomorrow.

About 7:30 we go to a big student dinner at the Azad Hall of Residence on the campus of the Institute. A very well-mannered senior undergraduate shows me about. First he shows me their exhibit of student art. Not bad.

Then I'm seated, along with about 1,800 others, for dinner. Oh me, it is hot Indian food with tap water to drink! But one of my guides suggests boiled water, which helps. But I don't eat much. During the dinner, students dressed as beggars, Brahmins, girl attendants to the goddess, etc. move about the tables in competition for prizes.

I'm told that the Institute was organized only in 1951. Students compete for places from all parts of India. The enrollment now is about 1,620. They have all branches of engineering including agricultural engineering. These students actually get more solid courses for work in soils than students at the agricultural colleges. For the first two years, they all take essentially the same courses.

They live in halls and are mixed up - boys from various States, vegetarians and nonvegetarians, and so on. Each student has his own single room.

After the dinner, of which I eat little, we are seated before an outdoor stage. The show is very slow in starting. I hear some Indian music and one shadow play.

The students accompany Dr. Basu and me back to the rest house at 10:00 p.m. I'm very tired indeed. I did get a very good impression of the students. A banana and to bed.

We return to the rest house at 5:50 just as darkness falls.
Then tea and notes for my speech for tomorrow.
About 7:30 we go to a big student dinner at the Azad Hall of
Residence on the campus of the Institute. A very well-mannered
senior undergraduate shows me about. First he shows me their exhibit
of student art. Not bad.
Then I'm seated, along with about 1,800 others, for dinner.
Oh me, it is hot Indian food with tea water to drink! But one of
my guides suggests boiled water, which helps. But I don't eat much.
During the dinner, students dressed as beggars, Brahmins, girl
attendants to the goddess, etc. move about the tables in competition
for prizes.
I'm told that the Institute was organized only in 1921. Students
compete for places from all parts of India. The enrollment now is
about 1,620. They have all branches of engineering including agri-
cultural engineering. These students actually get more solid courses
for work in soils than students at the agricultural colleges. For
the first two years, they all take essentially the same courses.
They live in halls and are mixed up - boys from various States,
vegetarians and nonvegetarians, and so on. Each student has his own
single room.
After the dinner, of which I eat little, we are seated before an
outdoor stage. The show is very slow in starting. I hear some Indian
music and one shadow play.
The students accompany Dr. Basu and me back to the rest house at
10:00 p.m. I'm very tired indeed. I did get a very good impression
of the students. A banana and to bed.

March 4

I'm up with the screeching birds and early light at 5:45.

Then tea, pack, and a little writing.

Dr. B. P. Ghildyal comes about 7:20 and we go to his house for breakfast. (All gentlemen, no ladies.) I make out with corn flakes and hot milk, and omit the "hot" Indian food. We return to the rest house, put our luggage in a little car, and I go to the Institute. From 9 to 10 I give a lecture on Soils and soil conservation.

After the lecture they take me out to a new farm being developed from this old Ground-Water Laterite soil. Here the surface is a reddish-yellow clay loam about 2 to 3 feet over the laterite. Where they have dug a large pit for water, the laterite is at least 20 feet deep. Experimental plantings of wheat have done very poorly, although irrigated. The soil is in terribly poor tilth. But legumes do well, and so do tree crops, including cashewnut trees. The soil needs more organic matter. I suspect that tree crops and bananas, which make considerable shade, would do better than grain in the blistering sun.

I look briefly at the laboratories and they show me the outline of courses, which looks quite good. This course here has the advantage of mathematics and the basic sciences. One of the professors says, however, that essentially all of their agricultural engineering students are city boys who find it difficult, for social reasons, to work with cultivators. Then too, they fear a bit for continued enrollment in agricultural engineering since salaries in government service are lower for them than for others in private corporations. Another old story in nearly every country!

March 4

I'm up with the screeching birds and early light at 5:45.

Then tea, pack, and a little writing.

Dr. B. P. Ghildyal comes about 7:30 and we go to his house for

breakfast. (All gentlemen, no ladies.) I make out with corn flakes

and hot milk, and omit the "hot" Indian food. We return to the rest

house, put our luggage in a little car, and I go to the Institute.

From 9 to 10 I give a lecture on Soils and soil conservation.

After the lecture they take me out to a new farm being developed

from this old Ground-Water laterite soil. Here the surface is a

reddish-yellow clay loam about 2 to 3 feet over the laterite. Where

they have dug a large pit for water, the laterite is at least 20 feet

deep. Experimental plantings of wheat have done very poorly, although

fertilized. The soil is in terribly poor clitch. But legumes do well,

and so do tree crops, including cashewnut trees. The soil needs more

organic matter. I suspect that tree crops and bananas, which make

considerable shade, would do better than grain in the blistering sun.

I look briefly at the laboratories and they show me the outline

of courses, which looks quite good. This course here has the advantage

of mathematics and the basic sciences. One of the professors says,

however, that essentially all of their agricultural engineering

students are city boys who find it difficult, for social reasons,

to work with cultivators. Then too, they fear a bit for continued

enrollment in agricultural engineering since salaries in government

service are lower for them than for others in private corporations.

Another old story in nearly every country!

Ap. XVI

About 11:00 we go to the station. It turns out that the train (from Madras) is late. So we sit about and talk. Finally we are off - Basu, Digar, and I - at 12:10, some 48 minutes late.

This first-class compartment is like a rolling jail with the small windows crossed with iron bars. It is now dusty and very hot, well over 100°F. (K-2810).

We reach the station for Calcutta at 2:15 and I'm taken in a jeep to the Grand Hotel in sunny, humid heat. As we stop for traffic, immediately beggar women with naked children come up to the cars. With the heat as it is, I shall not fight both heat and beggars but stay in my room and work on notes.

Then dinner and early to bed for an early morning air journey to Gauhati in Assam.

About 11:00 we go to the station. It turns out that the train (from Madras) is late. So we sit about and talk. Finally we are off - Beau, Diger, and I - at 12:10, some 48 minutes late. This first-class compartment is like a rolling jail with the small windows crossed with iron bars. It is now dusty and very hot, well over 100°F. (K-2810).

We reach the station for Calcutta at 2:15 and I'm taken in a jeep to the Grand Hotel in sunny, humid heat. As we stop for traffic, immediately beggar women with naked children come up to the cars. With the heat as it is, I shall not fight both heat and beggars but stay in my room and work on notes.

Then dinner and early to bed for an early morning air journey to Gauhati in Assam.



K-2810. March 4, 1959. About 10 miles east of Kharagpur.
Paddy bunds from mud balls.

K-2810. March 4, 1959. About 10 miles east of Kharagpur.
Paddy bunds from mud walls.

March 5

I am up a little earlier than necessary because of the noise. I have breakfast at 6:00 and check out at 6:30. A Bengali-speaking driver is available for me but neither Basu nor Digar come to the hotel, as agreed last night. So what to do? I wait until 6:55 and must assume they have gone directly to the airport another way.

I was told yesterday that they cannot get a law to keep the cattle out of the city because of a custom to set free a bull eleven days after a funeral. People either set free to roam a bull of their own or buy one for the purpose. As these cattle wander about, shopkeepers and others give them food!

At 7:20 I reach the airport and Basu and Digar come later. They now tell me that they called the hotel at 6:30 and were told that I had left. I asked the hotel reception at 6:50 whether any call had come for me and the reply had been "no." Who knows?

As we get into the plane for Gauhati at 8:00 a.m. it is already hot. I sit beside Raja Surendra Singh, Agricultural Production Advisor to the Minister of Food and Agriculture in Delhi. We are in the air at 8:15.

At first we fly over mixed suburbs and dry paddy fields with a few small ponds. There are stringers of mixed culture along the roads and a few spots with a bit of irrigation. Some of the intervening open areas are no doubt saline; low places are even wet as well as salty and not cropped now even though signs of former bunds may be seen. The villages are fairly open and have many trees. Here they

March 2

I am up a little earlier than necessary because of the noise. I have breakfast at 6:00 and check out at 6:30. A Bengali-speaking driver is available for me but neither Basu nor Digar come to the hotel, as agreed last night. So what to do? I wait until 6:55 and must assume they have gone directly to the airport another way. I was told yesterday that they cannot get a law to keep the cattle out of the city because of a custom to set free a bull eleven days after a funeral. People either set free to roam a bull of their own or buy one for the purpose. As these cattle wander about, shopkeepers and others give them food!

At 7:20 I reach the airport and Basu and Digar come later. They now tell me that they called the hotel at 6:30 and were told that I had left. I asked the hotel reception at 6:50 whether any call had come for me and the reply had been "no." Who knows?

As we get into the plane for Gaharti at 8:00 a.m. it is already hot. I sit beside Raja Surendra Singh, Agricultural Production Advisor to the Minister of Food and Agriculture in Delhi. We are in the air at 8:15.

At first we fly over mixed suburbs and dry paddy fields with a few small ponds. There are stringers of mixed culture along the roads and a few spots with a bit of irrigation. Some of the intervening open areas are no doubt saline; low places are even wet as well as salty and not cropped now even though signs of former bunds may be seen. The villages are fairly open and have many trees. Here they



are about one-fourth to one-half mile apart. The old pattern of previous braided streams and oxbows can be seen faintly. Some old river beds, low spots, and oxbows have stagnant water with green scum. (Most of this flight is over East Pakistan.)

At 8:30 (40 miles out?) the pattern is similar except for wider streamways with stagnant water and only a few scrubby trees. The large open areas are quite dry. No doubt the meandering drainageways carry water during the monsoon. The landscape looks very dry and light brown just now.

About 8:45 we cross a muddy, flowing stream, and beside it another smaller one. Again the villages have trees. In another 4 minutes we cross a large braided stream with large sandy islands. The same general landscape pattern continues. I suspect many areas having only faint field boundaries, or none at all, are waterlogged and salty. As we go on, the villages are nearer together and the clear field boundaries are more numerous.

About 9:55 we pass over a great area of sandy riverwash where two streams join, probably the lower Jamuna, as we fly a bit east of north. This stream has a very wide flood plain with many channels and sand bars. Some of the miserable villages on some of the low sandy islands must be frequently flooded. Now there are a few green fields that must be irrigated.

About 9:05 we pass over a small area of low hills with tiny, serpentine valleys between them. Then we are over an older undulating to rolling plain. The higher hills have forests. But these are only outliers in the plain.

are about one-fourth to one-half mile apart. The old pattern of previous braided streams and oxbows can be seen faintly. Some old river beds, low spots, and oxbows have stagnant water with green scum. (Most of this flight is over East Pakistan.)

At 8:30 (40 miles out?) the pattern is similar except for wider streamways with stagnant water and only a few scrubby trees. The large open areas are quite dry. No doubt the meandering drainageways carry water during the monsoon. The landscape looks very dry and light brown just now.

About 8:45 we cross a muddy, flowing stream, and beside it another smaller one. Again the villages have trees. In another 4 minutes we cross a large braided stream with large sandy islands. The same general landscape pattern continues. I suspect many areas having only faint field boundaries, or none at all, are waterlogged and salty. As we go on, the villages are nearer together and the clear field boundaries are more numerous.

About 9:55 we pass over a great area of sandy riverwash where two streams join, probably the lower Jammu, as we fly a bit east of north. This stream has a very wide flood plain with many channels and sand bars. Some of the miserable villages on some of the low sandy islands must be frequently flooded. Now there are a few green fields that must be irrigated.

About 9:05 we pass over a small area of low hills with tiny, serpentine valleys between them. Then we are over an older undulating to rolling plain. The higher hills have forests. But these are only outliers in the plain.

As we approach the border of Assam, I presume near Durgapur, low fleecy clouds come out to meet us. Among the clouds I see irregular, cleared fields, some on quite steep slopes. Some of the low mountain slopes now are nearly vertical. I see old fields in several stages of regeneration of the forest (or a small part may be tree crops). From this height I see little evidence of accelerated erosion.

But as we go on, I do see some eroded hills. Apparently some spots have mangoes, citrus, or other tree crops.

At 9:32 we fly over hills that look to be either nearly barren or with dry grass cover. Here I see good evidence of at least some erosion. Only a few fields are to be seen and these are rocky. But from the trails I would guess the land is grazed.

(The plane bumps badly over these high hills.) Then we come over a bad area that appears to be barren. (Added later: These hills were not bare. Later I see similar hills with reddish-brown grass on red soil of poor quality from sandstone over gneiss. There is considerable accelerated erosion but not really severe yet. It is the old story of overcropping poor soil, grass coming into the fallows instead of trees, and fire. Now the land is grazed.)

Next we fly over bolder hills of nearly solid woodland. At 9:45 I can look ahead to another green plain of the Brahmaputra River. As the plane comes down I see light grayish-brown paddy fields with some salty, waterlogged areas. The villages have palms, bamboos, and bananas. I can see that waterlogging, salt, and alkali are problems here.

As we approach the border of Assam, I presume near Durgam,
 low fleecy clouds come out to meet us. Among the clouds I see
 irregular, cleared fields, some on quite steep slopes. Some of
 the low mountain slopes now are nearly vertical. I see old fields
 in several stages of regeneration of the forest (or a small part
 may be tree crops). From this height I see little evidence of
 accelerated erosion.
 But as we go on, I do see some eroded hills. Apparently some
 spots have mangoes, citrus, or other tree crops.
 At 9:32 we fly over hills that look to be either nearly barren
 or with dry grass cover. Here I see good evidence of at least some
 erosion. Only a few fields are to be seen and these are rocky. But
 from the trails I would guess the land is grazed.
 (The plane bumps badly over these high hills.) Then we come
 over a bad area that appears to be barren. (Added later: These
 hills were not bare. Later I see similar hills with reddish-brown
 grass on red soil of poor quality from sandstone over gneiss. There
 is considerable accelerated erosion but not really severe yet. It
 is the old story of overcropping poor soil, grass coming into the
 fallows instead of trees, and fire. Now the land is grazed.)
 Next we fly over bolder hills of nearly solid woodland. At
 9:45 I can look ahead to another green plain of the Brahmaputra
 River. As the plane comes down I see light grayish-brown paddy
 fields with some salty, waterlogged areas. The villages have palms,
 bamboos, and bananas. I can see that waterlogging, salt, and alkali
 are problems here.

We are down in the Borjhor airport 12 miles from Gauhati at 9:50. We are met by Mr. P. C. Das, Divisional Forestry Officer for Jhum Control. (Jhum refers to clearing under shifting cultivation.) He tells me that several tribes live in the hills. We will go to the Garo Hills, occupied by the Garo tribal people. So after tea we leave in a carryall for Damra about two-thirds the way to Goalpara west of Gauhati, and a few miles south.

We drive a bit south, and then mostly west, except for curves, on a low, clayey, alluvial plain used for paddy. Then as we turn we are on a slightly higher terrace with fruit trees, bananas, arecanut palm, and bamboo. I see some small fields of vegetables and a few of irrigated wheat. Much of the way is on a fairly high road grade in a low, clayey plain of small, dry paddy fields. The road generally follows the higher terrace, but both small and large prongs of the low river plain reach back toward the hills and we cross them.

Most of the houses are of clay brick, or clay over bamboo matting. Some are whitewashed. The poorer ones have thatched roofs; the better ones steel.

Immediately along the road grade through the lowlands are wide shallow borrow pits, many with water in them. In places these have fish; that is, I suppose they have since people are fishing with nets and with wicker scoops.

The villages are only on the higher terrace or on the foot slopes of the hills amidst the mixed culture.

We are down in the Borjhar airport 12 miles from Gauhati at 9:50. We are met by Mr. P. C. Das, Divisional Forestry Officer for Jhum Control. (Jhum refers to clearing under shifting cultivation.) He tells me that several tribes live in the hills. We will go to the Garo Hills, occupied by the Garo tribal people. So after tea we leave in a carryall for Dama about two-thirds the way to Goalpara west of Gauhati, and a few miles south. We drive a bit south, and then mostly west, except for curves, on a low, clayey, alluvial plain used for paddy. Then as we turn we are on a slightly higher terrace with fruit trees, bananas, arecanut palm, and bamboo. I see some small fields of vegetables and a few of irrigated wheat. Much of the way is on a fairly high road grade in a low, clayey plain of small, dry paddy fields. The road generally follows the higher terrace, but both small and large prongs of the low river plain reach back toward the hills and we cross them. Most of the houses are of clay brick, or clay over bamboo matting. Some are whitewashed. The poorer ones have thatched roofs; the better ones steel. Immediately along the road grade through the lowlands are wide shallow borrow pits, many with water in them. In places these have fish; that is, I suppose they have since people are fishing with nets and with wicker scoops. The villages are only on the higher terrace or on the foot slopes of the hills amidst the mixed culture.

While the road generally goes on the first terrace above the lowland, it passes over areas of the lowland and northward jutting hills. The soils on the lowland are gray or light gray; those on the first terrace light brown; and those of the hills reddish-brown to red. I see no laterite, but the lower B₃ horizon has reticulate mottling.

I see just a few tiny bits of sugarcane.

Houses are built on either the natural terrace some 4 to 8 feet above the lowland used for paddy, which must be very wet during the rainy season, or on man-made terraces of the same height. In places the road ditches are deep and the people cross on arched bamboo bridges. (K-2811) Besides the others mentioned before in the mixed cultures, I see jack fruit and mangoes.

Generally, the houses are a bit better after the first 20 miles out. Some are quite attractive with white, plastered and whitewashed, split bamboo mats for walls and steel roofs. I'm told that nearly every house has a hand loom, especially for cotton saris.

Near the hills some patches of the low terrace have a brownish surface soil from hill wash. But one sees little accelerated erosion here. I see a few roadside trees covered with bright yellow, lacy dodder.

I try to photograph some women fishing but they turn or run.

At about 28 miles west of Gauhati we are along the edge of the hills and soon enter a reserve forest with a fair stand of sol. But even in a forest, any streamway is leveled and bunded for paddy. A part of the smooth upper terrace is forested, a part is used for mixed cultures, and a part seems to be in poor grassy

While the road generally goes on the first terrace above the lowland, it passes over areas of the lowland and northward jutting hills. The soils on the lowland are gray or light gray; those on the first terrace light brown; and those of the hills reddish-brown to red. I see no laterite, but the lower B₂ horizon has reticulate mottling.

I see just a few tiny bits of sugarcane. Houses are built on either the natural terrace some 4 to 8 feet above the lowland used for paddy, which must be very wet during the rainy season, or on man-made terraces of the same height. In places the road ditches are deep and the people cross on arched bamboo bridges. (K-2811) Besides the others mentioned before in the mixed cultures, I see jack fruit and mangoes.

Generally, the houses are a bit better after the first 20 miles out. Some are quite attractive with white, plastered and whitewashed split bamboo mats for walls and steel roofs. I'm told that nearly every house has a hand loom, especially for cotton series. Near the hills some patches of the low terrace have a brownish surface soil from hill wash. But one sees little accelerated erosion here. I see a few roadside trees covered with bright yellow, lacy bodder.

I try to photograph some women fishing but they turn or run. At about 28 miles west of Gumbati we are along the edge of the hills and soon enter a reserve forest with a fair stand of soil. But even in a forest, any streamway is leveled and banded for paddy. A part of the smooth upper terrace is forested, a part is used for mixed cultures, and a part seems to be in poor grassy



K-2811. March 5, 1959. 22 miles west of Gauhati.
View of bridge made from road grade to
homes on the terrace. (Bartezpur village).

K-2011. March 2, 1950. 22 miles west of Gantest.
View of bridge made from road grade to
homes on the terrace. (Baitzpur village).

and weedy fallow. The soils of the hills appear to be Red or Reddish-Brown Latosol from gneiss. I see a few cathedral-type termite mounds some 3 to 4 feet high.

At the edge of the hills are some teak plantings of various ages. Between milestones 31 and 33 we cross a broad tongue of the low paddy land that goes far south. As we go on, I see bouldery hills with scrub forest. Some of the best parts have been planted to teak; then again soil with mixed scrub on the rocky slopes. I see a few sheep.

At 37 miles I see some fine houses of plastered bamboo mats, some with thatched roofs, many with steel ones. Every low area is carefully leveled and banded for paddy.

Apparently we are behind schedule. Thank heaven this is a carryall and not a jeep! This same pattern of paddy, mixed culture, and forest continues. It is sunny and warm but pleasant. I'm told that the maximum temperature is 100° F. in August. Here the rainfall is about 90 inches from May to October. I should guess, at 50 miles per hour, that most of the soils on the terraces here, about 50 miles west of Gauhati, are Yellow Latosols, or these intergrading to Red Latosol. In places, the narrow winding, stream courses, banded for paddy, resemble those seen in Kerala. But I see no firm laterite.

I see a few tiny patches of tobacco; and I'm sure that I have missed other crops, such as maize, that may be grown in summer. Between milestones 56 and 61 we pass through another low paddy area with homes on both natural and man-made higher terraces. Thus I go

and weedy fallow. The soils of the hills appear to be Red or Reddish-Brown Latosol from Gneiss. I see a few cathedral-type termite mounds some 3 to 4 feet high.

At the edge of the hills are some teak plantings of various ages. Between milestones 31 and 33 we cross a broad tongue of the low paddy land that goes far south. As we go on, I see bouldery hills with scrub forest. Some of the best parts have been planted to teak; then again soil with mixed scrub on the rocky slopes. I see a few sheep.

At 37 miles I see some fine houses of plastered bamboo mats, some with thatched roofs, many with steel ones. Every low area is carefully leveled and banded for paddy.

Apparently we are behind schedule. Thank heaven this is a carpal and not a jeep! This same pattern of paddy, mixed culture, and forest

continues. It is sunny and warm but pleasant. I'm told that the maximum temperature is 100° F. in August. Here the rainfall is about 90 inches from May to October. I should guess, at 50 miles per hour, that most of the soils on the terraces here, about 50 miles west of Guntur, are Yellow Latosols, or these intergrading to Red Latosol. In places, the narrow winding, stream courses, banded for paddy, resemble those seen in Kerala. But I see no firm laterite.

I see a few tiny patches of tobacco; and I'm sure that I have mixed other crops, such as maize, that may be grown in summer. Between milestones 55 and 61 we pass through another low paddy area with homes on both natural and man-made higher terraces. Thus I go

from the paddy soil to undulating terrace with sol forest, to undulating terrace under farm use, and again back to paddy at milestone 63. This extends far to the south and as far north as the eye can reach. At milestone 65.5 we are back on the upland terrace. At milestone 66 we turn south off the main road. Here I see the usual mixed culture with arecanut palm, bananas, etc.

In a little way the people have rough pasture, fields for monsoon crops, and a few bits of tobacco, vegetables, and paddy. After two miles the cover is sol and scrub forest with some mixed cropping, including arecanut palm.

At four miles south of the road we come to the village of Damra on the Dudhoi River, just at market time. (K-2812; K-2813) We come to the cabin, where we will stay, at 12:46. The cabin is placed high (6 feet) above the ground on strong posts. It may not be so good but we shall see. At least we have a good lunch.

At 2:00 p.m. we leave to go south into the Garo Hills. (K-2814)

First we cross an area of paddy land along the flood plain back of the natural levee of the Dudhoi River. I see several herdsmen with small groups of scrubby cattle. Each carries a black umbrella. The high terrace, or rather broad natural levee, has mixed culture and sol forest. The trucks coming out of the hills with logs raise a terrible dust. We pass teak plantings.

At 4 miles below Damra we pass a Garo village with patches of mixed culture on the natural levee and some paddy in low places. We pass a lot of forest land that should be good for crops but little

from the paddy soil to undulating terrace with soil forest, to undulating terrace under farm use, and again back to paddy at milestone 63. This extends far to the south and as far north as the eye can reach. At milestone 62.5 we are back on the upland terrace. At milestone 66 we turn south off the main road. Here I see the usual mixed culture with arecanut palm, bananas, etc. In a little way the people have rough pasture, fields for monsoon crops, and a few bits of tobacco, vegetables, and paddy. After two miles the cover is soil and scrub forest with some mixed cropping, including arecanut palm.

At four miles south of the road we come to the village of Damra on the Dudhal River, just at market time. (K-2812; K-2813) We come to the cabin, where we will stay, at 12:46. The cabin is placed high (6 feet) above the ground on strong posts. It may not be so good but we shall see. At least we have a good lunch.

At 2:00 p.m. we leave to go south into the Garo Hills. (K-2814)

First we cross an area of paddy land along the flood plain back of the natural levee of the Dudhal River. I see several herdsmen with small groups of scrubby cattle. Each carries a black umbrella. The high terrace, or rather broad natural levee, has mixed culture and soil forest. The trucks coming out of the hills with logs raise a terrible dust. We pass teak plantings.

At 4 miles below Damra we pass a Garo village with patches of mixed culture on the natural levee and some paddy in low places. We pass a lot of forest land that should be good for crops but little



K-2812. March 5, 1959. 70 miles west and a bit south of Gauhati. The village market at Damra.



K-2813. March 5, 1959. 70 miles west and a bit south of Gauhati. Another view of the village market at Damra.

K-2813. March 5, 1959. 70 miles west and a bit south
of Gaudhadi. The village market at Damra.

K-2813. March 5, 1959. 70 miles west and a bit south
of Gaudhadi. Another view of the village
market at Damra.



K-2814. March 5, 1959. About 70 miles west and a bit south of Gauhati at Damra. The Dudhnoi River from a few feet in front of our cabin.



K-2815. March 5, 1959. 6 miles south of Damra. View of area of strongly rolling Red to Reddish-Brown Latosol under shifting cultivation.

K-2814. March 5, 1959. About 70 miles west and a
bit south of Cahaba at Barre. The Indian
River from a few feet in front of our cabin.

K-2815. March 5, 1959. 6 miles south of Barre.
View of area of strongly rolling hills to
Reddish-Brown laterol under shifting
cultivation.

of it is used. / Apparently most Garo people like the hills better. I suppose too, they want to avoid the heat and the malaria of these lower elevations.

Mr. Das says that generally in these hills before us, the people have 1 or 2 years of crop after clearing and burning and 6 to 20 years of bush fallow. Here the first year is short-staple cotton. The second year is a mixed culture of maize and upland paddy. Much bamboo comes up in the fallows, especially if the cycle is short. I'm told that there is likely to be soil erosion on the strong slopes for a short time when the crops are first seeded.

The soil here is a deep pervious, Red Latosol - Reddish-Brown Latosol intergrade. The moist B is a dark red (2.5YR 3/6) clay that is friable to mixed subangular blocky and coarse granular. The roots go deeply. Slopes run up to more than 70 percent and are quite irregular.

I try photos, but the high bamboos along the roadside, even on 60 to 100 percent slope, make it very difficult. (K-2815) I see fresh clearings (jhum) (K-2816) and various stages of regeneration. (K-2817; K-2818) Here the cycle has been shortened too much in places and bamboo makes up a high percentage of the regrowth.

We drive on south to Wageasi, some 9 miles south of Damra, where there is a small demonstration center for the cultivation of cash crops, especially Arabica and Robusta coffee (K-2819; K-2820), cashewnut trees, and black pepper vines. The elevation is 900 feet and the rainfall

of it is used. Apparently most Gato people like the hills better. I suppose too, they want to avoid the heat and the malaria of these lower elevations.

Mr. Das says that generally in these hills before us, the people have 1 or 2 years of crop after clearing and burning and 6 to 10 years of bush fallow. Here the first year is short-staple cotton. The second year is a mixed culture of maize and upland paddy. Much bamboo comes up in the fallows, especially if the cycle is short. I'm told that there is likely to be soil erosion on the strong slopes for a short time when the crops are first seeded.

The soil here is a deep pervious, Red Latosol - Reddish-Brown Latosol intergrade. The moist B is a dark red (2.5YR 3/6) clay that is friable to mixed subangular blocky and coarse granular. The roots go deeply. Slopes run up to more than 70 percent and are quite irregular.

I try photos, but the high bamboos along the roadside, even on 60 to 100 percent slope, make it very difficult. (K-2815) I see fresh clearings (Jhum) (K-2816) and various stages of regeneration. (K-2817; K-2818) Here the cycle has been shortened too much in places and bamboo makes up a high percentage of the regrowth.

We drive on south to Wagaai, some 9 miles south of Dama, where there is a small demonstration center for the cultivation of cash crops, especially Arabica and Robusta coffee (K-2819; K-2820), cashewnut trees, and black pepper vines. The elevation is 900 feet and the rainfall



K-2816. March 5, 1959. 7 miles south of Damra. Fresh clearing (jhum). It will be burned and the seed (probably cotton) will be broadcast after the first shower. This area is now being cropped for at least the third time. Note wild bananas.

K-2816. March 5, 1959. 7 miles south of Dams. Fresh clearing
(Jhum). It will be burned and the seed (probably cotton)
will be broadcast after the first shower. This area is
now being cropped for at least the third time. Note wild
bananas.



K-2817. March 5, 1959. 7 miles south of Damra.
Regrowth after cropping under shifting
cultivation. Note tall feathery grass -
Saccharum procerum.



K-2818. March 5, 1959. 9 miles south of Damra.
View into cultivated hills.

K-2817. March 5, 1959. 7 miles south of Dumas.
Regrowth after cropping under shifting
cultivation. Note tall feathery grass -
Saccharum procerum.

K-2818. March 5, 1959. 9 miles south of Dumas.
View into cultivated hills.



K-2819. March 5, 1959. 9 miles south of Damra.
3-year-old Arabica coffee.



K-2820. March 5, 1959. 9 miles south of Damra.
1-year-old Arabica coffee.

K-2819. March 2, 1959. 9 miles south of Darna.
3-year-old Arabica coffee.

K-2820. March 2, 1959. 9 miles south of Darna.
1-year-old Arabica coffee.

95 inches. They began in 1954 with 250 acres of hill land. The soil is a slightly weak, clayey Reddish-Brown Latosol, deep even on the hills, and with beautiful reticulate mottling in the lower part (B₃).

Cashewnuts are planted on 104 acres, under Tephrosia candida, a leguminous shrub that furnishes shade and is thought to improve the soil. Sixteen acres are under coffee and some 5 acres have been planted to pepper vines. They have here one forester, 3 forest guards, and 6 molis (gardeners).

I try for some more shots of the clearings. (K-2821) These are very hard to get when one is surrounded by trees and bamboo. I look at the young coffee, the pepper vines, and the nurseries for coffee and pepper.

Now at 4:00 p.m. it is already getting late for pictures. It is absurd to have Assam in the same time zone as the rest of India.

On the way back I try for more kodachromes of the shifting cultivation, cattle, and homes. (K-2823) The women and children are very camera shy. Here some of the Garo people have been persuaded to come down to lower elevations where their opportunities are better.

Near Damra, we drive through one large village of Garo people said to have 1,000 houses. They have a considerable area for paddy. Their homes set amidst mixed cultures of bananas and trees. (K-2824) They have also many flowering trees and shrubs. It is too dark for color but I try black-and-white.

95 inches. They began in 1924 with 250 acres of hill land. The soil is a slightly weak, clayey Reddish-Brown Latosol, deep even on the hills, and with beautiful reticulate mottling in the lower part (B₃).

Cashewnuts are planted on 104 acres, under *Tephrosia candida*, a leguminous shrub that furnishes shade and is thought to improve the soil. Sixteen acres are under coffee and some 5 acres have been planted to pepper vines. They have here one forester, 3 forest guards, and 6 molis (gardeners).

I try for some more shots of the clearings. (K-2821) These are very hard to get when one is surrounded by trees and bamboo. I look at the young coffee, the pepper vines, and the nurseries for coffee and pepper.

Now at 4:00 p.m. it is already getting late for pictures. It is absurd to have Assam in the same time zone as the rest of India.

On the way back I try for more Kodachromes of the shifting

cultivation, cattle, and homes. (K-2823) The women and children are very camera shy. Here some of the Garo people have been persuaded to come down to lower elevations where their opportunities are better.

Near Damra, we drive through one large village of Garo people said to have 1,000 houses. They have a considerable area for paddy. Their homes set amidst mixed cultures of bananas and trees. (K-2824) They have also many flowering trees and shrubs. It is too dark for color but I try black-and-white.



K-2821. March 5, 1959. 9 miles south of Damra.
Distant view of shifting cultivation.

K-2821. March 5, 1959. 9 miles south of Dams. Distant view of shifting cultivation.



K-2823. March 5, 1959. 4 miles south of Damra.
A village home of Garo people.



K-2824. March 5, 1959. Near Damra. View in Nishangra village.

K-2823. March 5, 1959. 4 miles south of Demra.
A village home of Gero people.

K-2824. March 5, 1959. Near Demra. View in Nishangra village.

I step into a central building for cooperative hand-loom work. Most of the colored cotton saris are sold locally. Besides these hand looms, some families have them in their homes.

We are back to the cabin at 5:25. It is dark now.

Of course, I got only into the edge of the Garo Hills District of some 5,000 square miles. I'm told that each village has its own land. The Chief (or "siem") traditionally has rights over the land and allots it to the people, but actually with approval of the village council. The tribal people are matriarchal: inheritance is to the youngest daughter. The husband of the youngest daughter comes to her home. Over one-half are Christian. American Baptists, Catholics, and others have missions here.

Now it is cool and pleasant after a very long and interesting day. I'm told that the Tribal Advisory Council feels that the 30 demonstrations of "cash" crops already established for cashewnut, pepper, coffee, cardamon, and rubber have shown that these crops can be grown. Further tests are needed for nutmeg, cocoa, and cloves. It is felt that emphasis now should be given on help to the tribal cultivators with seeds and plants of the proved crops.

But in addition they need to have more food crops, such as paddy, millet, potatoes, maize, and the like. Tea and cotton are already grown. For these crops appropriate terraces will need to be developed.

I cannot plug my electric razor into the kerosene lantern so I'll wait for morning.

And so to bed.

I step into a central building for cooperative hand-loom work.
Most of the colored cotton saris are sold locally. Besides these
hand looms, some families have them in their homes.
We are back to the cabin at 5:25. It is dark now.
Of course, I got only into the edge of the Garo Hills District
of some 2,000 square miles. I'm told that each village has its own
land. The Chief (or "stem") traditionally has rights over the land
and allocates it to the people, but actually with approval of the village
council. The tribal people are matrilineal: inheritance is to the
youngest daughter. The husband of the youngest daughter comes to
her home. Over one-half are Christian. American Baptists, Catholics,
and others have missions here.
Now it is cool and pleasant after a very long and interesting day.
I'm told that the Tribal Advisory Council feels that the 30 demonstra-
tions of "cash" crops already established for cashewnut, pepper,
coffee, cardamom, and rubber have shown that these crops can be grown.
Further tests are needed for nutmeg, coconuts, and cloves. It is felt
that emphasis now should be given on help to the tribal cultivators
with seeds and plants of the proved crops.
But in addition they need to have more food crops, such as paddy,
millet, potatoes, maize, and the like. Tea and cotton are already
grown. For these crops appropriate terraces will need to be developed.
I cannot plug my electric razor into the kerosene lantern so I'll
wait for morning.
And so to bed.

March 6

We are up at early dawn about 5:30. (K-2825) I have a bit of trouble getting everybody off to an early start as planned. We do leave at 7:35 because I want to try for some color photos in the village I saw last night in twilight - Nischangram.

I go for a moment into one of the houses and look at the hand loom. Besides the mixed cultures of arecanut palm, bananas, and so on most home gardens have a small patch of tobacco and each family has a plot in the large area of adjacent paddy land on the low terrace.

We return to Damra and leave for Gauhati on the same road we came at 8:00 a.m. I pause, here and there, for a few photographs especially of characteristic timber stands. (K-2826; K-2827; K-2828; K-2829)

I am told that sol is good for timber but warps too much to use in furniture. It certainly is a wonderful tree for this country. It is hardy and does well with a little protection. (K-2830)

Within a few miles of Gauhati we drive to the edge of the Brahmaputra River where it is now cutting into a village. The river changed its course after an earthquake and then a big flood in 1952-1953 hit the village of Palasbari.

We drive through the village, which has two or more big saw mills, then over low paddy land on a new high grade. In places some of the small borrow pits have been deepened for a number of purposes: for fish, for pottery clay, for mud balls to make field bunds, for earth to repair the road, and to make grades to houses along with the bamboo bridges.

March 6

We are up at early dawn about 5:30. (K-2822) I have a bit

of trouble getting everybody off to an early start as planned.

We do leave at 7:35 because I want to try for some color photos

in the village I saw last night in twilight - Nischangram.

I go for a moment into one of the houses and look at the hand

loom. Besides the mixed cultures of arecanut palm, bananas, and so

on most home gardens have a small patch of tobacco and each family

has a plot in the large area of adjacent paddy land on the low terrace.

We return to Damra and leave for Gauhati on the same road we came

at 8:00 a.m. I pause, here and there, for a few photographs especially

of characteristic timber stands. (K-2826; K-2827; K-2828; K-2829)

I am told that soil is good for timber but warps too much to use

in furniture. It certainly is a wonderful tree for this country. It

is hardy and does well with a little protection. (K-2830)

Within a few miles of Gauhati we drive to the edge of the

Brahmaputra River where it is now cutting into a village. The river

changed its course after and earthquake and then a big flood in

1952-1953 hit the village of Palasbari.

We drive through the village, which has two or more big saw

mills, then over low paddy land on a new high grade. In places some

of the small borrow pits have been deepened for a number of purposes:

for fish, for pottery clay, for mud balls to make field bunds, for

earth to repair the road, and to make grades to houses along with

the bamboo bridges.



K-2825. March 6, 1959. Damra. Our cabin.



K-2826. March 6, 1959. 45 miles west of Gauhati.
Characteristic stand of intermediate-aged sol.
(All lowlands are used for paddy even in the
forest.)

K-2825. March 6, 1959. Dams. Our cabin.

K-2826. March 6, 1959. 45 miles west of Gashu.
Characteristic stand of intermediate-aged soil.
(All lowlands are used for paddy even in the
forest.)



K-2827. March 6, 1959. 45 miles west of Gauhati.
Intermediate-aged sal in the Jharikuri Forest.



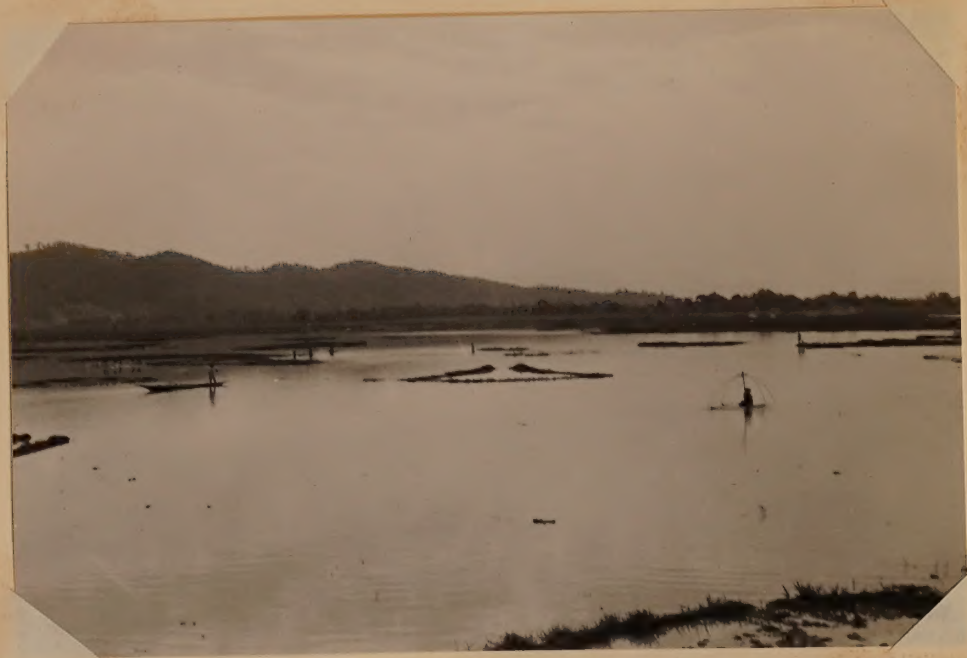
K-2828. March 6, 1959. 39 miles west of Gauhati.
A 10-year-old stand of planted sal. (Some
grazing permitted.)

K-2827. March 6, 1959. 45 miles west of Gannett.
Intermediate-aged soil in the Jarvik forest.

K-2828. March 6, 1959. 39 miles west of Gannett.
A 10-year-old stand of planted soil. (Some
grazing permitted.)



K-2829. March 6, 1959. 37.5 miles west of Gauhati.
A 30-year-old stand of teak.



K-2830. March 6, 1959. 16 miles west of Gauhati.
Fishing.

K-2829. March 6, 1959. 37.5 miles west of Gannett.
A 30-year-old stand of teak.

K-2830. March 6, 1959. 16 miles west of Gannett.
Flamingo.

About nine miles out we pass several large brick kilns and then the forestry school and a bit later the University. We pass some small mountains as high islands of latosolic Lithosol on granite in the city suburbs. Then we come again to the bank of the big river.

I am told that Gauhati has a population of about one lakh. Along the road are many people, mostly poor people, cows, goats, and cycle rickshaws. These rickshaws have brilliantly patterned leather seats. There is a profusion of small shops. (K-2831)

We check our airline tickets for our return journey on March 10 and then sit for tea.

We drive out along the river and drop the forestry officer who has been our host, Mr. P. C. Das, and go on with his car and driver for Shillong. The color, variety, and apparent confusion of these streets defy description.

About 11:40 a.m. we reach the edge of the main city. Then for a way we pass large paddy areas, bits of both natural and man-made higher terraces with homes, and high hills to the side. We do up into the hills along a major side valley. At 6 miles there is a little irrigated paddy. By $7\frac{1}{2}$ miles the valley is very narrow with only small patches of paddy. Then we go up a winding heavy grade. The soils appear to be Reddish-Brown Latosols with scrub forest, including sol, but mostly bamboo after jhumming. Only a few patches are newly cleared. After this climb I see narrow paddy fields and plantings of bananas, mangoes, and some pineapples on the slopes. At 10 miles we are again in the hills. (K-2832)

About nine miles out we pass several large brick kilns and then the forestry school and a bit later the University. We pass some small mountains as high islands of laccolite. Lithosol on granite in the city suburbs. Then we come again to the bank of the big river.

I am told that Gauhati has a population of about one lakh. Along the road are many people, mostly poor people, cows, goats, and cycle rickshaws. These rickshaws have brilliantly patterned leather seats. There is a profusion of small shops. (K-2831) We check our airline tickets for our return journey on

March 10 and then sit for tea.

We drive out along the river and drop the forestry officer who has been our host, Mr. P. C. Das, and go on with his car and driver for Shillong. The color, variety, and apparent confusion of these streets defy description.

About 11:40 a.m. we reach the edge of the main city. Then for a way we pass large paddy areas, bits of both natural and man-made higher terraces with homes, and high hills to the side. We do up into the hills along a major side valley. At 6 miles there is a little irrigated paddy. By 7½ miles the valley is very narrow with only small patches of paddy. Then we go up a winding heavy grade. The soils appear to be Reddish-Brown Latosols with scrub forest, including soil, but mostly bamboo after felling. Only a few patches are newly cleared. After this climb I see narrow paddy fields and plantings of bananas, mangoes, and some pineapples on the slopes.

At 10 miles we are again in the hills. (K-2832)



K-2831. March 6, 1959. Gauhati. Street scene.

K-2831. March 6, 1959. Gaubati. Street scene.



K-2832. March 6, 1959. 11.5 miles south of Gauhati.
Partial view of homestead.



K-2833. March 6, 1959. 20 miles south of Gauhati. Pineapples
on strongly sloping red soil; paddy in foreground and
slightly better-than-average homestead.

K-2883. March 6, 1959. 20 miles south of Gahnest. Pineapples on strongly sloping red soil; paddy in foreground and slightly better-than-average homestead.

K-2832. March 6, 1959. 11.5 miles south of Gahnest. Partial view of homestead.

At about 11.5 miles we come to the barrier for the one-way mountain road to Shillong. After a few minutes wait we start out just a bit after noon. I see mostly hilly Red and Reddish-Brown Latosols with some fair-sized alluvial areas banded for paddy. These steep soils are amazingly deep on slopes up to and over 100 percent. On the well-drained bits of terrace and the lower slopes I see citrus, bananas, mangoes, the odd patch of pineapples, and tapioca. (K-2833). A few bits of the paddy are irrigated.

I am told that the Khasi tribal people occupy this great area to Shillong and beyond to the East Pakistan border.

I see a few new clearings of 2 to 5 acres on slopes above 45 percent, perhaps to nearly 100 percent, but not many. The hills vary in cover depending upon the period since cultivation. Many of the nearly vertical ones have quite good forest since they have never been cleared. But the easier slopes have bamboo thickets. In places the valley widens out to a quarter of a mile or more.

We climb and wind around many unnumbered hairpins. The rocks are exposed some where the steep monsoon drainageways come down the hill-sides. But considering its past treatment and the steep slopes I have seen very few soils that were less erodible. Almost immediately after cultivation there comes a protective cover of bamboo.

I try photographs of the shifting cultivation. (K-2834; K-2835)
In a few places I see attempts at very narrow step terraces.

At about 11.5 miles we come to the barrier for the one-way mountain road to Shillong. After a few minutes wait we start out just a bit after noon. I see mostly hilly Red and Reddish-Brown Latosols with some fair-sized alluvial areas bounded for paddy. These steep soils are amazingly deep on slopes up to and over 100 percent. On the well-drained bits of terrace and the lower slopes I see citrus, bananas, mangoes, the odd patch of pineapples, and tapioca. (K-2833). A few bits of the paddy are irrigated.

I am told that the Khasi tribal people occupy this great area to Shillong and beyond to the East Pakistan border.

I see a few new clearings of 2 to 5 acres on slopes above 45 percent, perhaps to nearly 100 percent, but not many. The hills vary in cover depending upon the period since cultivation. Many of the nearly vertical ones have quite good forest since they have never been cleared. But the easier slopes have bamboo thickets. In places the valley widens out to a quarter of a mile or more.

We climb and wind around many unnumbered hairpins. The rocks are exposed some where the steep monsoon drainageways come down the hill-sides. But considering its past treatment and the steep slopes I have seen very few soils that were less erodible. Almost immediately after cultivation there comes a protective cover of bamboo.

I try photographs of the shifting cultivation. (K-2834; K-2835) In a few places I see attempts at very narrow step terraces.



K-2834. March 6, 1959. 24 miles south of Gauhati. Shifting cultivation (jhumming) and burning the cut trees.



K-2835. March 6, 1959. 24 miles south of Gauhati. A small Khasi village.

K-2834. March 6, 1959. 24 miles south of Gaudet. Shifting cultivation (burning) and burning the cut trees.

K-2835. March 6, 1959. 24 miles south of Gaudet. A small Khasi village.



K-2836. March 6, 1959. 37 miles south of Gauhati.
Terracing of steep Reddish-Brown Latosol.
Cinchona planting done in 1940. It will
be harvested this year and planted to sol.
(Ipicac plantation area.)

K-2836. March 6, 1959. 37 miles south of Gumbati.
Terracing of steep Reddish-Brown Latosol.
Cinchona planting done in 1940. It will
be harvested this year and planted to soil.
(Ipicac plantation area.)

We are now approaching Nongpoh, a half-way station. We must hurry because the south-bound travel will start in a little while. I am not able to take many photos. Interestingly in India, I see no bullock carts whatever on this road. Here and there small teak plantings represent work of the forestry department. Near Nongpoh the cover is poor near the road and I see a little paddy in the very narrow bunded valleys.

We reach Nongpoh and are driven to the bungalow of the forestry department for lunch, for which we have 30 minutes. It takes a lot of urging and a bit of bribery to get this done on time. My tea comes just as I walk to the car.

We are on again toward Shillong at 1:35 p.m. I see a little paddy and some terracing on the foot slopes. About 37 miles south of Gauhati we pass the Ipicac plantation area where cinchona was planted in 1942 with terraces on Reddish-Brown Latosol. This will be harvested soon and the area planted to sol.

Along here I see very few new clearings and some quite good second-growth forest on the steep slopes.

At milestone 42 we come into a poorer area. The soils are mainly Red Latosols, tending a bit toward Yellow Latosols. Most of the soils are rather pinkish and developed from sandstone that lies over the granite. But in places the soil of the lower slopes is Reddish-Brown Latosol from this rather basic granite and gneiss. Quite a bit of widely spaced pine now appears.

We are now approaching Nongpon, a half-way station. We must hurry because the south-bound travel will start in a little while. I am not able to take many photos. Interestingly in India, I see no bullock carts whatever on this road. Here and there small tea plantings represent work of the forestry department. Near Nongpon the cover is poor near the road and I see a little paddy in the very narrow bounded valleys.

We reach Nongpon and are driven to the bungalow of the forestry department for lunch, for which we have 30 minutes. It takes a lot of urging and a bit of bribery to get this done on time. My tea comes just as I walk to the car.

We are on again toward Shillong at 1:35 p.m. I see a little paddy and some terracing on the foot slopes. About 37 miles south of Gauhati we pass the typical plantation area where cinchona was planted in 1942 with terraces on Reddish-Brown Latosol. This will be harvested soon and the area planted to soil.

Along here I see very few new clearings and some quite good second-growth forest on the steep slopes.

At milestone 42 we come into a poorer area. The soils are mainly Red Latosols, trending a bit toward Yellow Latosols. Most of the soils are rather pinkish and developed from sandstone that lies over the granite. But in places the soil of the lower slopes is Reddish-Brown Latosol from this rather basic granite and gneiss. Quite a bit of widely spaced pine now appears.

As we go on I see small fields with narrow bunds probably for potatoes and sweetpotatoes, and I see a few rather poor patches of pineapples. Here the valleys are a bit wider and they have several patches of paddy.

It rains.

These hills have a lot of coarse grass. In places it is being burned. The cover is poor except in the deep ravines well below the sandstone. The hills are grass-covered except for thin stands of pine (Pinus excelsior).

These pinkish soils from sandstone are poorer than those from granite and gneiss, and a bit thinner, partly from erosion, except for the lower easy slopes which have been thickened a bit. I suspect that the cycle of shifting cultivation was too short for these soils, that grass invaded the fallows, that the grass is annually burned, and that soil fertility is very low and getting lower.

Between milestones 51 and 54 we pass through a nearly treeless area of rolling land, mostly covered with wild grass with paddy in the bottoms. Some of these hills have been burned recently, probably in the hopes of getting fresh grass for the buffalo and goats. I see a few spots of pine and bamboo.

As we go on into the still higher hills I see moderate stands of fairly good pine measuring 8 to 12 inches d.b.h. I am told this is now getting into Pinus khasiana.

At about milestone 64 we come into the Shillong suburbs and pass the gate at 3:00 p.m. The population is said to be around 60,000. They have two colleges in this capital city. The rainfall is around 75 inches (?).

As we go on I see small fields with narrow bunds probably
for potatoes and sweetpotatoes, and I see a few rather poor patches
of pineapples. Here the valleys are a bit wider and they have
several patches of paddy.
It rains.
These hills have a lot of coarse grass. In places it is being
burned. The cover is poor except in the deep ravines well below the
sandstone. The hills are grass-covered except for thin stands of
pine (Pinus excelsior).
These pinkish soils from sandstone are poorer than those from
granite and gneiss, and a bit thinner, partly from erosion, except
for the lower easy slopes which have been thickened a bit. I suspect
that the cycle of shifting cultivation was too short for these soils,
that grass invaded the fallows, that the grass is annually burned,
and that soil fertility is very low and getting lower.
Between milestones 51 and 52 we pass through a nearly treeless
area of rolling land, mostly covered with wild grass with paddy in
the bottoms. Some of these hills have been burned recently, probably
in the hopes of getting fresh grass for the buffalo and goats. I see
a few spots of pine and bamboo.
As we go on into the still higher hills I see moderate stands of
fairly good pine measuring 8 to 12 inches d.b.h. I am told this is now
getting into Pinus khasiana.
At about milestone 64 we come into the Shillong suburbs and pass
the gate at 3:00 p.m. The population is said to be around 60,000.
They have two colleges in this capital city. The rainfall is around
75 inches (?)

The Khasi people here have some Mongolian features. Most loads are carried in conical baskets on the back with headbands. For draft they use some small horses.

We drive first to the office of the Chief Conservator of Forests, Mr. M. C. Jacob, who has just been made also Director of Soil Conservation. He tells us that the city is crowded and they could get reservations only in the best hotel, which pleases me but displeases my Indian companions, Dr. Basu and Mr. Digar.

Jacob says that so far the State lacks legislation for terracing by a village or district scheme. They even have difficulty persuading cultivators in proposed demonstration areas even though all of the costs are paid by the State with grants from the Center. He hopes to experiment with both diesel pumps and hydro-rams for irrigated paddy on terraced land.

We meet the Senior Conservator of Forests, Mr. Justman Swer, a Christian tribal man, and also Mr. R. M. Das, a divisional forest officer.

We go to the Pinewood Hotel. I order a fire laid. This seems like a delightful place but a bit on the cool side.

Poor Basu is terribly worried about the cost of the room - Rs 26 including meals. Yet he paid nothing during the last four nights.

I meet another Mukherjee, Assistant Director of Agriculture in Nepal. Apparently he spends most of his time here in Shillong since the Governor here has also been given considerable responsibility for Nepal.

The Khasi people here have some Mongolian features. Most loads are carried in conical baskets on the back with headbands. For draft they use some small horses.

We drive first to the office of the Chief Conservator of Forests, Mr. M. C. Jacob, who has just been made also Director of Soil Conservation. He tells us that the city is crowded and they could get reservations only in the best hotel, which pleases me but displeases my Indian companions, Dr. Basu and Mr. Digar.

Jacob says that so far the State lacks legislation for terracing by a village or district scheme. They even have difficulty persuading cultivators in proposed demonstration areas even though all of the costs are paid by the State with grants from the Center. He hopes to experiment with both diesel pumps and hydro-rams for irrigated paddy on terraced land.

We meet the Senior Conservator of Forests, Mr. Justman Swer, a Christian tribal man, and also Mr. R. M. Das, a divisional forest officer.

We go to the Pinewood Hotel. I order a fire laid. This seems like a delightful place but a bit on the cool side. Poor Basu is terribly worried about the cost of the room - Rs 26 including meals. Yet he paid nothing during the last four nights.

I meet another Mukherjee, Assistant Director of Agriculture in Nepal. Apparently he spends most of his time here in Shillong since the Governor here has also been given considerable responsibility for Nepal.

Apparently I should not have tipped our driver. He was to have come for us at 5:00 but he doesn't show up, so we get another car. I take a look at some of the hand-loom work and buy a cotton stole from Manipur and a bit of reserve tobacco.

At 6:00 we go to the home of Mr. William Sangma at his request. He is the Tribal Minister in the State government and is himself a tribal man from Tura of the Garo Hills. But he has some people waiting and we have to wait for him.

Meanwhile Mr. Jacob comes. He hopes to be able to have rotational grazing in strips for dairy cattle (mainly buffalo I presume) on the easier slopes of these man-made grassland areas and pine trees with fire protection on the steep slopes. He hopes to make a strong effort for tree crops in mixed cultures. He says they start these tree crops in demonstration areas and, when they get growing well, they bring families to see the results and ask them to select suitable places for local trials within their own village area. He thinks the tribal people should get seed, seedlings, and technical guidance for both mixed cultures and forestry. A very important problem is the difficulty of convincing them that if they plant these trees that they won't lose their rights to the land when the area is reforested. Unless they can convince the chiefs that the forest is for their own use they will have none of it.

Then comes in Mr. C. M. Jormanaik. I gather that he is a "siem," a tribal man who holds land in custody for one of the tribes numbering some 20,000 people. He is elected to his position by the tribal people

Apparently I should not have tipped our driver. He was to have come for us at 5:00 but he doesn't show up, so we get another car. I take a look at some of the hand-loom work and buy a cotton stole from Manipur and a bit of reserve tobacco.

At 6:00 we go to the home of Mr. William Sangma at his request. He is the Tribal Minister in the State Government and is himself a tribal man from Tura of the Garo Hills. But he has some people waiting and we have to wait for him.

Meanwhile Mr. Jacob comes. He hopes to be able to have rotational grazing in strips for dairy cattle (mainly buffalo I presume) on the easier slopes of these man-made grassland areas and pine trees with fire protection on the steep slopes. He hopes to make a strong effort for tree crops in mixed cultures. He says they start these tree crops in demonstration areas and, when they get growing well, they bring families to see the results and ask them to select suitable places for local trials within their own village area. He thinks the tribal people should get seed, seedlings, and technical guidance for both mixed cultures and forestry. A very important problem is the difficulty of convincing them that if they plant these trees that they won't lose their rights to the land when the area is reforested. Unless they can convince the chiefs that the forest is for their own use they will have none of it.

Then comes in Mr. C. M. Jomanaik. I gather that he is a "sien", a tribal man who holds land in custody for one of the tribes numbering some 20,000 people. He is elected to his position by the tribal people

and they have also elected him to the State Assembly. He is a Christian, educated in a mission school, and trained as a lawyer. His features are somewhat Mongolian but he speaks better English than any of the others I have met up to now in Assam. Like most educated tribal people, he wears ordinary European dress.

I take it that he is a rather conservative gentleman and responsible for this unhappy grassland area, a bit of which I saw near Shillong this afternoon. He says that if the fires are stopped, Shillong will be without milk! But Jacob says that milk production from the buffalo has been dropping according to local graziers from 2 to 1/2 seers per animal. (One seer is a little over two pounds.)

By now Minister Sangma has come in and he suggests controlled grazing through a cooperative colony.

But then he leaves again. He is continually in and out to instruct his servants and to answer the telephone. He argues with Mr. Jormanaik: He has given him a drink but the old gentleman insists that he is on the water wagon. Yet the host tells him that he knows the tribal custom: Once a gift is given, it cannot be taken back or used by anyone else. (But the old man sticks by his guns and the drink is left for the servants.)

Jacob pretty well dominates the conversation. He says that tribal people must be used for extension work in the hills because they speak the unwritten language and can help overcome the fear that the tribes will lose some of their lands.

and they have also elected him to the State Assembly. He is a Christian, educated in a mission school, and trained as a lawyer. His features are somewhat Mongolian but he speaks better English than any of the others I have met up to now in Assam. Like most educated tribal people, he wears ordinary European dress.

I take it that he is a rather conservative gentleman and responsible for this unhappy grassland area, a bit of which I saw near Shillong this afternoon. He says that if the fires are stopped, Shillong will be without milk! But Jacob says that milk production from the buffalo has been dropping according to local graziers from 2 to 1½ seers per animal. (One seer is a little over two pounds.) By now Minister Sangma has come in and he suggests controlled grazing through a cooperative colony.

But then he leaves again. He is continually in and out to instruct his servants and to answer the telephone. He argues with Mr. Jormanshik: He has given him a drink but the old gentleman insists that he is on the water wagon. Yet the host tells him that he knows the tribal custom: Once a gift is given, it cannot be taken back or used by anyone else. (But the old man sticks by his guns and the drink is left for the servants.)

Jacob pretty well dominates the conversation. He says that tribal people must be used for extension work in the hills because they speak the unwritten language and can help overcome the fear that the tribes will lose some of their lands.

(Obviously there is much duplication between the forestry group and the Department of Agriculture. Both are working on the tree "cash" crops, both are distributing seeds and seedlings, and both are making terraces.)

Then to add to the confusion, the Under Secretary for Tribal Affairs, Mr. Rymbai, comes in. (I am told later that he really runs the show.)

With the Minister going in and out and with nearly everyone talking at once I finally close my notebook, drink tea, and relax.

We are back to the hotel at 7:30 with no dinner until 8:00 p.m., which is about 9:00 p.m. by sun time. Mr. R. M. Das says he will come for us at 7:00 a.m. for a trip to Cherrapunji. We have to go then in order to make the time schedules of the one-way roads.

The boy comes and lights my fire, coal over pine. By the time I am back from dinner the room is warm and cozy.

This has been a long, interesting, and tiring day. Except for these hills north of Shillong with covers of grass or poor scrub forest, the hill soils are deep and potentially productive, especially for mixed cultures, including tree crops, pepper, bananas, and perhaps others not yet tried, such as nutmeg, cloves, and cacao. The main point is to keep the soil shaded and protected from beating rains.

Obviously these tribal people have lived so long in these high hills that most of them prefer the steeply sloping soils and refuse the more undulating soils at the lower elevations.

And so to bed.

(Obviously there is much duplication between the forestry

group and the Department of Agriculture. Both are working on the tree "cash" crops, both are distributing seeds and seedlings, and both are making terraces.)

Then to add to the confusion, the Under Secretary for Tribal

Affairs, Mr. Rymal, comes in. (I am told later that he really

runs the show.)

With the Minister going in and out and with nearly everyone

talking at once I finally close my notebook, drink tea, and relax.

We are back to the hotel at 7:30 with no dinner until 8:00 p.m.,

which is about 9:00 p.m. by sun time. Mr. R. M. Das says he will

come for us at 7:00 a.m. for a trip to Cherrapunji. We have to go

then in order to make the time schedules of the one-way roads.

The boy comes and lights my fire, coal over pine. By the time

I am back from dinner the room is warm and cozy.

This has been a long, interesting, and tiring day. Except for

these hills north of Shillong with covers of grass or poor scrub

forest, the hill soils are deep and potentially productive, especially

for mixed cultures, including tree crops, pepper, bananas, and perhaps

others not yet tried, such as nutmeg, cloves, and cacao. The main

point is to keep the soil shaded and protected from beating rains.

Obviously these tribal people have lived so long in these high

hills that most of them prefer the steeply sloping soils and refuse

the more undulating soils at the lower elevations.

And so to bed.

March 7

For some reason I cannot sleep after 4:45. I see the watchman at 5:00 a.m. and he builds me a fire. My room bearer brings me a skimpy breakfast at 6:10. Fortunately I have some bananas. Mr. R. M. Das comes and we leave at 7:05 on a cool sunny morning for Cherrapunji to the southwest.

Shillong is built on a rolling to strongly rolling landscape. There are many of these Khasi pine trees (Pinus khasiana) all about and also Cryptomeria japonica, an exotic, some "blue" pine (Pinus excelsior), a few scattered oaks, and others. The houses are widely spaced.

Unhappily, there is no time to stop since we must be at the gate for the one-way road at 7:40. At the margin of the city we pass Cedrus deodara and a few exotic flowering trees. Then there are some pine plantations on the slopes.

We go up to about 5,000 feet. I see some hilly terraced soil for monsoon crops, I suppose mainly maize and potatoes, and a little paddy. Most of the soil here is under old shifting cultivation. The cycle has been shortened and only a little is now forested. There has been much erosion. Quite a bit of the soil is used in lazy beds with shallow ditches up and down the slopes, even on slopes of 45 percent or a bit more.

After about 7 miles most of the pine drops out. We pass some very gently sloping to nearly level bunded paddy land with last year's stubble and now partly irrigated with stored rainwater, for what reason I do not know. Some of the hilly fields have rather poor

March 7

For some reason I cannot sleep after 4:45. I see the watchman at 5:00 a.m. and he builds me a fire. My room bearer brings me a skimpy breakfast at 6:10. Fortunately I have some bananas. Mr. R. M. Das comes and we leave at 7:05 on a cool sunny morning for Cherrapunji to the southwest.

Shillong is built on a rolling to strongly rolling landscape. There are many of these khast pine trees (Pinus khasiana) all about and also Grytomeria japonica, an exotic, some "blue" pine (Pinus excelsior), a few scattered oaks, and others. The houses are widely spaced.

Unhappily, there is no time to stop since we must be at the gate for the one-way road at 7:40. At the margin of the city we pass Cedrus deodara and a few exotic flowering trees. Then there are some pine plantations on the slopes.

We go up to about 5,000 feet. I see some hilly terraced soil for monsoon crops. I suppose mainly maize and potatoes, and a little paddy. Most of the soil here is under old shifting cultivation. The cycle has been shortened and only a little is now forested. There has been much erosion. Quite a bit of the soil is used in lacy beds with shallow ditches up and down the slopes, even on slopes of 45 percent or a bit more.

After about 7 miles most of the pine drops out. We pass some very gently sloping to nearly level bounded paddy land with last year's stubble and now partly irrigated with stored rainwater, for what reason I do not know. Some of the hilly fields have rather poor

terraces at wide intervals and strongly sloping lazy beds for maize and potatoes between them. Then we go by very rugged land with steep rocky slopes and thin rocky spurs. The sun is perfect for photography and what a pity we have to hurry. Of course the country looks bad now because this is the end of the dry season which breaks next month.

Most of this red soil seems to be from sandstone; but a part is from other rocks, probably granite. Had the critical slopes been protected, erosion would not have been so bad.

We come to the gate at 7:40 and must reach the next one 19 miles away on a hilly winding road at 9:10. Along here are many slopes, some eroded, with lazy beds for potatoes and maize. To make these the cultivators put grass, twigs, small sticks, and even poles on the ground in beds around 3 to 4 feet wide and about 6 to 12 feet long. The beds are about 12 to 18 inches apart and the space between is a shallow ditch from which sods are taken. Then they cover these with sods and burn. When they plant the crop they use compost and manure if they have it. Generally the beds are put up and down the slope for good drainage. Potatoes from wet soil have poor keeping quality. Thus experience from gently sloping soil gets transferred to steeply sloping soil, as in Puerto Rico with tobacco. I should certainly like to know why this practice works so well. The burning certainly (1) supplies some phosphorus, potassium, magnesium, calcium, and other nutrients; (2) it improves the structure of the very surface soil, at least temporarily; (3) it kills certain insects and other pests in the surface soil.

terraces at wide intervals and strongly sloping lazy beds for
maize and potatoes between them. Then we go by very rugged land
with steep rocky slopes and thin rocky spurs. The sun is perfect
for photography and what a pity we have to hurry. Of course the
country looks bad now because this is the end of the dry season
which breaks next month.

Most of this red soil seems to be from sandstone; but a part
is from other rocks, probably granite. Had the critical slopes
been protected, erosion would not have been so bad.

We come to the gate at 7:40 and must reach the next one 19 miles
away on a hilly winding road at 9:10. Along here are many slopes,
some eroded, with lazy beds for potatoes and maize. To make these
the cultivators put grass, twigs, small sticks, and even poles on
the ground in beds around 3 to 4 feet wide and about 6 to 12 feet
long. The beds are about 12 to 18 inches apart and the space between
is a shallow ditch from which soda are taken. Then they cover these
with soda and burn. When they plant the crop they use compost and
manure if they have it. Generally the beds are put up and down the
slope for good drainage. Potatoes from wet soil have poor keeping
quality. Thus experience from gently sloping soil gets transferred
to steeply sloping soil, as in Puerto Rico with tobacco. I should
certainly like to know why this practice works so well. The burning
certainly (1) supplies some phosphorus, potassium, magnesium, calcium,
and other nutrients; (2) it improves the structure of the very surface
soil, at least temporarily; (3) it kills certain insects and other
pests in the surface soil.

Some places along here have an open poor grass cover, with some fields here and there in favored places for maize, potatoes, and upland paddy.

At about 18 miles the road takes us along very steep slopes on the edge of a canyon that goes down several hundred feet just beside me. Even slopes here at 60 to 100 percent have been cultivated and some still are. (K-2837)

At around 21 miles I see cultivators burning some more of the lazy beds. I am told that about 50 of these beds take one maund of seed for a harvest of 10 maunds of potatoes.

The rainfall is now over 300 inches and the soils are yellowish-red. Fertility must be very low with only scattered trees and mainly poor grass that is frequently burnt. Most of the soils are developed from sandstone but there are deep layers of limestone and coal. (K-2838) I don't recall ever seeing before such hilly soil used for crops. Many of the fields must have soil slopes of nearly 100 percent. The general cover is grass, ^{with} low trees and shrubs, including rhododendrons, on the very steepest parts. Many of the slopes are practically vertical; in fact, a few are more than that where the hard thick caps overhang the canyon walls.

Some of the retaining walls for the road grade are cut out of soft highly lateritic sandstone that hardens on exposure.

At 25½ miles we pass another hilltop village. I see more and more coal mines. These are relatively shallow pits on the steep hillsides from which both men and women dig out a kind of soft,

Some places along here have an open poor grass cover, with some fields here and there in favored places for maize, potatoes, and upland paddy.

At about 18 miles the road takes us along very steep slopes on the edge of a canyon that goes down several hundred feet just beside me. Even slopes here at 60 to 100 percent have been cultivated and some still are. (K-2837)

At around 21 miles I see cultivators burning some more of the lazy beds. I am told that about 50 of these beds take one mound of seed for a harvest of 10 mounds of potatoes.

The rainfall is now over 300 inches and the soils are yellowish-red. Fertility must be very low with only scattered trees and mainly poor grass that is frequently burnt. Most of the soils are developed from sandstone but there are deep layers of limestone and coal. (K-2838)

I don't recall ever seeing before such hilly soil used for crops. Many of the fields must have soil slopes of nearly 100 percent. The general cover is grass, low trees and shrubs, including rhododendrons, on the very steepest parts. Many of the slopes are practically vertical; in fact, a few are more than that where the hard thick caps overhang the canyon walls.

Some of the retaining walls for the road grade are cut out of soft highly limestic sandstone that hardens on exposure.

At 25 1/2 miles we pass another hilltop village. I see more and more coal mines. These are relatively shallow pits on the steep hillsides from which both men and women dig out a kind of soft,



K-2837. March 7, 1959. 18.5 miles south of Shillong.
View in Dumpep village area.



K-2838. March 7, 1959. 27.5 miles south of Shillong.
Small coal mine.

K-2837. March 7, 1959. 18.5 miles south of Salliong.
View in Dumping village area.

K-2838. March 7, 1959. 27.5 miles south of Salliong.
Small coal mine.

nearly brown, coal. The coal is collected into conical baskets carried on the back with a head band over this rough terrain and dumped into piles along the road for the trucks. Some of them are struggling long distances up rocky slopes of 100 percent.

We come into Cherrapunji at 8:50. (K-2839) I am told that the annual rainfall here is around 550 inches. Yet the hills are so steep and the canyons so narrow that drinking water is sometimes scarce! The population is said to be about 5,000. Most of the Khasi tribal people are Christians, mainly Catholics.

We drive up to the Circuit House to arrange for tea about noon in order to wait for the second opening of the gate at 1:00 p.m. Then we go on south.

We are traveling on a rolling mountain top. Except for one small piece of good forest the cover is mostly thin grass that furnishes poor grazing for the odd goat. The soil is thin and there are many flattish rock outcrops of sandstone and of rehardened laterized sandstone. I visualize that this rain-soaked rolling plateau once had deeper soil and an uneven fluctuating water table that laterized the materials in the sandstone other than quartz. Although maintaining its structural appearance, such weathered sandstone is soft; but when exposed it rehardens; and to the casual observer this resembles unweathered sandstone.

Here and there I see nearly black soils that make me think of Mountain Meadow. These are in pockets of very gentle slope that receive additional water and are not significantly eroding now. We go on south through some interesting villages. Mawsmi village makes

Go on south through some interesting villages. Mawmaw village makes
receive additional water and are not significantly eroding now. We
Mountain Meadow. There are in pockets of very gentle slope that
Here and there I see nearly black soils that make me think of
unweathered sandstone.
when exposed it rehardens; and to the casual observer this resembles
its structural appearance, such weathered sandstone is soft; but
the materials in the sandstone other than quartz. Although maintaining
had deeper soil and an uneven fluctuating water table that laterized
sandstone. I visualize that this rain-soaked rolling plateau once
flatish rock outcrops of sandstone and of rehardened laterized
poor grazing for the odd goat. The soil is thin and there are many
piece of good forest the cover is mostly thin grass that furnishes
We are traveling on a rolling mountain top. Except for one small
Then we go on south.
In order to wait for the second opening of the gate at 1:00 p.m.
We drive up to the Circuit House to arrange for tea about noon
Khasi tribal people are Christians, mainly Catholics.
scarce! The population is said to be about 5,000. Most of the
so steep and the canyons so narrow that drinking water is sometimes
the annual rainfall here is around 550 inches. Yet the hills are
We come into Cherrapunji at 8:50. (K-2839) I am told that
are struggling long distances up rocky slopes of 100 percent.
dumped into piles along the road for the trucks. Some of them
carried on the back with a head band over this rough terrain and
nearly brown, coal. The coal is collected into conical baskets



K-2839. March 7, 1959. Cherrapunji.
Coming into the town.

K-2839. March 7, 1959. Christy, J.
Coming into the town.

one thinks of France with its very narrow stone-paved street. The villagers grow some potatoes, maize, and vegetables, including peas and cabbages. The village water supply, used a bit for irrigation, is carried into the village by connected lengths of bamboo pipe.

We drive on to Mawblang village about 5 miles south of Cherrapunji where the main road ends. This old paved road did go on down the hills into the plain that is now East Pakistan. (K-2840; K-2841). But wheel traffic is now stopped by a concrete barrier although many people walk down toward the plain carrying fruits to barter and others walk back with heavy loads of arecanuts and other things.

From these uplands one can look across great canyons and over into Pakistan. The soil here is mainly yellowish, latosolic Lithosol with a cover of grass and bushes. Among all these boulders are some very old chunks of laterite, probably formed many thousands of years ago. I see a few pieces of the massive honeycombed laterite but much of it is the rehardened laterized sandstone.

I notice that another new earthen hill road, which branches off somewhat above this village, winds around through the hills down toward the Pakistan border. I assume that this is only for military patrols.

I am told that the people in these villages purchase fish from other villagers back in the hills and sell them to Shillong.

one thinks of France with its very narrow stone-paved street. The villagers grow some potatoes, maize, and vegetables, including peas and cabbages. The village water supply, used a bit for irrigation, is carried into the village by connected lengths of bamboo pipe.

We drive on to Mawlang village about 5 miles south of Cherrapunji where the main road ends. This old paved road did go on down the hills into the plain that is now East Pakistan. (K-2840; K-2841). But wheel traffic is now stopped by a concrete barrier although many people walk down toward the plain carrying fruits to market and others walk back with heavy loads of arecanuts and other things. From these uplands one can look across great canyons and over into Pakistan. The soil here is mainly yellowish, lateritic, and some with a cover of grass and bushes. Among all these boulders are some very old chunks of laterite, probably formed many thousands of years ago. I see a few pieces of the massive honeycombed laterite but much of it is the rehardened laterized sandstone. I notice that another new earthen hill road, which branches off somewhat above this village, winds around through the hills down toward the Pakistan border. I assume that this is only for military patrols. I am told that the people in these villages purchase fish from other villagers back in the hills and sell them to Shillong.



K-2840. March 7, 1959. 5 miles south of Cherrapunji.
View across the mountains into East Pakistan.



K-2841. March 7, 1959. 5 miles south of Cherrapunji.
A mountain view.

K-2840. March 7, 1959. 2 miles south of Chertanunji.
View across the mountains into East Pakistan.

K-2841. March 7, 1959. 2 miles south of Chertanunji.
A mountain view.

We walk on beyond the road end (K-2842; K-2843). For some reason we come onto a nice little valley of alluvium that does not seem to be used. I am told that the vegetation on the adjacent slope is climax, or close to it (K-2844). Prominent in this vegetation is a long-leafed small palm said to be called taolasubon.

I take photographs (K-2845; K-2846) and we drive back to Cherrapunji and around the town to a high promontory occupied by a nearly new Catholic Church. (K-2847) I talk some with the old priest - a nice old man from Italy. He shows us the church, which is very nice and neat as wax. He says that he has seen 36 inches of rain here within 24 hours and as much as 14 inches in one hour! He says, "You have no idea what a mess things are, and my church gets so dirty."

But I guess these Khasi people still count on the best of two possible worlds. The Father points out to me a sacred grove of the original forest. (K-2848) No Khasi would pluck even a leaf for fear of reprisal from the old gods. (What a pity I didn't know about this earlier but there isn't time to hike over to it now.) Formerly the Khasis made their sacrifices in the sacred wood and the Father does not tell me that the practice is entirely stopped.

He says that most people in Cherrapunji live from coal mining or trade. I take it that many villagers walk in long distances over the mountain paths. Nor would I want to bet that all of them were above a little profitable smuggling from Pakistan.

We walk on beyond the road end (K-2842; K-2843). For some reason we come onto a nice little valley of alluvium that does not seem to be used. I am told that the vegetation on the adjacent slope is climax, or close to it (K-2844). Prominent in this vegetation is a long-leaved small palm said to be called taolanodon. I take photographs (K-2845; K-2846) and we drive back to Chetrapunji and around the town to a high promontory occupied by a nearly new Catholic Church. (K-2847) I talk some with the old priest - a nice old man from Italy. He shows us the church, which is very nice and neat as wax. He says that he has seen 36 inches of rain here within 24 hours and as much as 14 inches in one hour! He says, "You have no idea what a mess things are, and my church gets so dirty."

But I guess these Khasi people still count on the best of two possible worlds. The Father points out to me a sacred grove of the original forest. (K-2848) No Khasi would pluck even a leaf for fear of reprisal from the old gods. (What a pity I didn't know about this earlier but there isn't time to hike over to it now.) Formerly the Khasis made their sacrifices in the sacred wood and the Father does not tell me that the practice is entirely stopped.

He says that most people in Chetrapunji live from coal mining or trade. I take it that many villagers walk in long distances over the mountain paths. Nor would I want to bet that all of them were above a little profitable smuggling from Pakistan.



K-2842. March 7, 1959. About 5.5 miles south of Cherrapunji.
On the old road.



K-2843. March 7, 1959. About 5.5 miles south of Cherrapunji.
Another view on the old road.

K-2842. March 7, 1959. About 2.5 miles south of Chertsey.
On the old road.

K-2843. March 7, 1959. About 2.5 miles south of Chertsey.
Another view on the old road.



K-2844. March 7, 1959. About 5.5 miles south of Cherrapunji. Close view of near climax vegetation. Note long-leafed palms called Taolasubon.

K-284. March 7, 1959. About 5.5 miles south of
Chertapumji. Close view of near climax
vegetation. Note long-leaved palms called
Tolashon.



K-2845. March 7, 1959. 5 miles south of Cherrapunji.
Local pharmacy in Mawblang village.



K-2846. March 7, 1959. 3 miles south of Cherrapunji.
View of Mawmai village. Note bamboo pipe
for taking out irrigation water.

K-2815. March 7, 1959. 2 miles south of Chavapung.
Local pharmacy in Nawlang village.

K-2816. March 7, 1959. 3 miles south of Chavapung.
View of Nawlang village. Note bamboo grove
for taking out irrigation water.



K-2847. March 7, 1959. Cherrapunji. View from a high hill at the edge of town. The sacred wood at the right.



K-2848. March 7, 1959. Cherrapunji. View from high hill. The Khasi sacred wood in the center.

K-2847. March 7, 1959. Cherrapunji. View from a high hill at the edge of town. The sacred wood at the right.

K-2848. March 7, 1959. Cherrapunji. View from high hill. The Khasi sacred wood in the center.

We go back to the rest house for our tea and lunch. Just here, near the town, I see a few cattle and goats; but further south I had seen only goats.

We have abundant tea, bread, and clear pale yellow honey from the citrus flowers. With the bananas we brought I make out well.

The servants here have a nice garden in a nearly flat low place with the typical high lazy beds for a rainy area.

We leave at 12:45 p.m. to be at the gate when it opens at 1:00. Both men and women carry very heavy loads of wood by the headband. These are cut into about 3-foot lengths and neatly tied into bundles that must weight 60 to 80 pounds. Again I see the small coal workings along the road and people working very hard to bring this coal up from deep canyons in baskets held by the head band. Some of these must weight 80 to 90 pounds and they struggle up rocky slopes of 60 percent or more (K-2849).

I also stop to photograph one of the many old graveyards marked by both small and huge vertical slabs (K-2850).

I photograph some of the new lazy beds made and fired for potatoes. These I photograph are about 3 feet wide and 6 feet long. The beds are about 18 to 30 inches apart (K-2851). These are on an easy slope but further north the same kind are on steep slopes. (K-2852; K-2853; K-2854).

We continue on north along the same road and pass the one-way gate at 2:05 p.m. with a few minutes to spare.

We go back to the rest house for our tea and lunch. Just here,

near the town, I see a few cattle and goats; but further south I

had seen only goats.

We have abundant tea, bread, and clear pale yellow honey from

the citrus flowers. With the bananas we brought I make out well.

The servants here have a nice garden in a nearly flat low place

with the typical high lazy beds for a rainy area.

We leave at 12:45 p.m. to be at the gate when it opens at 1:00.

Both men and women carry very heavy loads of wood by the headband.

These are cut into about 3-foot lengths and neatly tied into bundles

that must weight 60 to 80 pounds. Again I see the small coal workings

along the road and people working very hard to bring this coal up

from deep canyons in baskets held by the head band. Some of these

must weight 80 to 90 pounds and they struggle up rocky slopes of

60 percent or more (K-2849).

I also stop to photograph one of the many old graveyards marked

by both small and huge vertical slabs (K-2850).

I photograph some of the new lazy beds made and fixed for potatoes.

These I photograph are about 3 feet wide and 6 feet long. The beds are

about 18 to 30 inches apart (K-2851). These are on an easy slope but

further north the same kind are on steep slopes. (K-2852; K-2853;

K-2854).

We continue on north along the same road and pass the one-way

gate at 2:05 p.m. with a few minutes to spare.



K-2849. March 7, 1959. 28 miles south of Shillong. A coal mine with workers bringing it up to the road in conical baskets. A steep rocky slope.



K-2850. March 7, 1959. 27.5 miles south of Shillong. Old graveyard, together with old lazy beds.

K-2849. March 7, 1959. 28 miles south of Shillong. A coal mine with workers bringing it up to the road in conical baskets. A steep rocky slope.

K-2850. March 7, 1959. 27.5 miles south of Shillong. Old graveyard, together with old lazy beds.



K-2851. March 7, 1959. 27.5 miles south of Shillong.
New lazy beds for potatoes on any easy slope.



K-2852. March 7, 1959. 14.7 miles south of Shillong.
Hillside cultivation for maize and potatoes.

K-2851. March 7, 1959. 27.5 miles south of Shillong.
New lazy beds for potatoes on any easy slope.

K-2852. March 7, 1959. 14.7 miles south of Shillong.
Hillside cultivation for maize and potatoes.



K-2853. March 7, 1959. 13 miles south of Shillong.
Burning the lazy beds.



K-2854. March 7, 1959. 12.5 miles south of Shillong.
Hillside cultivation.

K-2853. March 7, 1959. 13 miles south of Shillong.
Burning the laxy beds.

K-2854. March 7, 1959. 15.2 miles south of Shillong.
Hillside cultivation.

Unhappily, the light is not good for photographing these beautiful hillsides between the gate and Shillong. I must come out early some morning. (Added later: Which I am able to do.)

We are back to the hotel about 3:00 p.m. After tea I take a short drive for a newspaper and then am back to the hotel.

This was an interesting trip today. Apparently shifting cultivation began long ago, and still continues in places. But now the southern part of these rolling uplands some 15 to 20 miles south of Shillong have mostly poor grass with a bit of gardening in the places where local alluvium accumulates.

Nearer Shillong the soil is still cultivated where possible in raised beds running up and down the slope, with a few attempts at terracing.

Since the original clearing - and no one knows when that was - there must have been a good deal of erosion, but there is no way to know how much. Now these people in the southern part of the area near Cherrapunji are mining coal in about as hard a way as I ever saw.

I think that at one time the smoother hilltops had considerable formation of laterite in the lower part of the soil. Many of the rocks on top are hardened strongly laterized sandstone. Even now, workmen cut out the soft sandstone underneath in blocks that harden on exposure. Then too, underneath some of these masses of hardened lateritic sandstone is a yellow soil material that is probably of recent origin, weathered from the formerly deep sandstone beneath the zone of laterization. In coves of local alluvium, the soil is

Unhappily, the light is not good for photographing these beautiful hill-sides between the gate and Shillong. I must come out early some morning. (Added later: Which I am able to do.) We are back to the hotel about 3:00 p.m. After tea I take a short drive for a newspaper and then am back to the hotel. This was an interesting trip today. Apparently shifting cultivation began long ago, and still continues in places. But now the southern part of these rolling uplands some 15 to 20 miles south of Shillong have mostly poor grass with a bit of gardening in the places where local alluvium accumulates. Nearer Shillong the soil is still cultivated where possible in raised beds running up and down the slope, with a few attempts at terracing. Since the original clearing - and no one knows when that was - there must have been a good deal of erosion, but there is no way to know how much. Now these people in the southern part of the area near Cherrapunji are mining coal in about as hard a way as I ever saw. I think that at one time the smoother hillsides had considerable formation of laterite in the lower part of the soil. Many of the rocks on top are hardened strongly laterized sandstone. Even now, workmen cut out the soft sandstone underneath in blocks that harden on exposure. Then too, underneath some of these masses of hardened lateritic sandstone is a yellow soil material that is probably of recent origin, weathered from the formerly deep sandstone beneath the zone of laterization. In coves of local alluvium, the soil is

nearly black - a sort of Mountain Meadow. Possibly this area had quite deep soil above the zone of laterization while under the original forest.

Mr. S. Majid, Director of Agriculture comes to see me about 5:00. He says that Delhi refused to go forward with a soil conservation station for this hill country, after plans were developed, with the excuse that it was a local socio-economic problem!

He points out that 73 percent of the population of Assam is agricultural, not counting the workers on the tea estates. With them counted it is 84 percent. Then too, they have little industry in Assam. Although they lack accurate figures, they estimate that 92 percent of the cropped areas is in the plains and only 8 percent in the hills. But if these hill people are to continue to live something must be done for them. Some areas in the hills have water that could be developed. Many new crops and cropping systems can be tried. I agree with his remark that Dr. Uppal and others have oversimplified the problem. We discuss having a main station at 2,500 to 3,000 feet and one substation at 1,000 to 2,500 and another at about 4,000 to 5,000. These would be a fair minima to start. He says he wants combined research and demonstrations. Such work would require a conservation engineer for developing water and irrigation, a soil conservationist, a soil scientist, a chemist, a botanist, a horticulturist, and a marketing expert.

nearly black - a sort of Mountain Meadow. Possibly this area had
 quite deep soil above the zone of laterization while under the
 original forest.

Mr. S. Majid, Director of Agriculture comes to see me about
 2:00. He says that Delhi refused to go forward with a soil conser-
 vation station for this hill country, after plans were developed,
 with the excuse that it was a local socio-economic problem!

He points out that 73 percent of the population of Assam is
 agricultural, not counting the workers on the tea estates. With
 them counted it is 84 percent. Then too, they have little industry
 in Assam. Although they lack accurate figures, they estimate that
 92 percent of the cropped areas is in the plains and only 8 percent
 in the hills. But if these hill people are to continue to live
 something must be done for them. Some areas in the hills have water
 that could be developed. Many new crops and cropping systems can be
 tried. I agree with his remark that Dr. Upad and others have over-
 simplified the problem. We discuss having a main station at 2,500
 to 3,000 feet and one substation at 1,000 to 2,500 and another at
 about 4,000 to 5,000. These would be a fair minima to start. He
 says he wants combined research and demonstrations. Such work would
 require a conservation engineer for developing water and irrigation,
 a soil conservationist, a soil scientist, a chemist, a botanist,
 a horticulturist, and a marketing expert.

He feels that industry will not develop enough to support social services. Especially must the hill people plan to become a bit more than self sufficient. It cannot be done entirely with tree crops because they need other foods, such as maize, millet, and tapioca. He wants trials of the several varieties for different soils and elevations.

He says that about one-half of the land of Assam is in the hills. He thinks it takes a much longer time to restore fertility in the high hills than in the lower areas. Certainly under shifting cultivation the restoration forest grows more vigorously under the high temperatures of the low elevations.

He does not agree that soil conservation should be under the foresters. (But I understand that it will be.) He says the foresters have the money but they are mainly concerned with the areas under shifting cultivation. They are stressing the tree crops, but he fails to see how they can handle the grains and other crops.

The Director takes his leave a little after six. I read awhile, have dinner, then read some more by the fire and go to bed.

He feels that industry will not develop enough to support social services. Especially must the hill people plan to become a bit more than self sufficient. It cannot be done entirely with tree crops because they need other foods, such as maize, millet, and tapioca. He wants trials of the several varieties for different soils and elevations. He says that about one-half of the land of Assam is in the hills. He thinks it takes a much longer time to restore fertility in the high hills than in the lower areas. Certainly under shifting cultivation the restoration forest grows more vigorously under the high temperatures of the low elevations. He does not agree that soil conservation should be under the foresters. (But I understand that it will be.) He says the foresters have the money but they are mainly concerned with the areas under shifting cultivation. They are stressing the tree crops, but he fails to see how they can handle the grains and other crops. The Director takes his leave a little after six. I read awhile, have dinner, then read some more by the fire and go to bed.

March 8 (Sunday)

I am up at 5:45 and make a fire. Tea comes and I read a bit and then have breakfast at 6:30. This is a slightly hazy, cool, sunny morning.

At 6:50 Director M. S. Majid and Mr. Mawsing Kharsati, soil conservationist, come in one of these awful jeeps. It is not only a jeep, it is a worn and tattered jeep. The Director drives. Dr. Basu and I sit in the front seat while Digar, Kharsati, and the regular driver sit in the back.

We leave for Jowai at 6:55. This town has an elevation of around 4,600 feet and is said to have 200 inches of annual rainfall. It is situated a little south of east of Shillong.

In this direction, we again have pine at the edge of the city on Red Latosol from sandstone. We pass the gate and are again on another one-way mountain road.

We stop so that I can look again at these beds for potatoes and maize. Here they are about 30 inches wide, 5 to 15 feet long, and some 30 inches apart. The wood has been piled on the beds, covered with sod, and already fired (K-2855).

Nearby I look at some beds with the sod in place and ready for burning (K-2856).

My guides are a bit vague but I take it that many of these beds are used for maize, potatoes, and soybeans in mixed cultures. When maize is grown alone or essentially alone I am told that 10 maunds to the acre can be expected. Certainly this yield of about 820 pounds

March 8 (Sunday)

I am up at 5:45 and make a fire. Tea comes and I read a bit and then have breakfast at 6:30. This is a slightly hazy, cool, sunny morning.

At 6:50 Director M. S. Majid and Mr. Mawasing Kharsati, soil conservationist, come in one of these awful jeeps. It is not only a jeep, it is a worn and tattered jeep. The Director drives. Dr. Basu and I sit in the front seat while Digar, Kharsati, and the regular driver sit in the back.

We leave for Jowai at 6:55. This town has an elevation of around 4,600 feet and is said to have 200 inches of annual rainfall. It is situated a little south of east of Shillong.

In this direction, we again have pine at the edge of the city on Red Jatsaoi from sandstone. We pass the gate and are again on another one-way mountain road.

We stop so that I can look again at these beds for potatoes and maize. Here they are about 30 inches wide, 5 to 15 feet long, and some 30 inches apart. The wood has been piled on the beds, covered with sod, and already fired (K-2852).

Nearly I look at some beds with the sod in place and ready for

burning (K-2856).

My guides are a bit vague but I take it that many of these beds

are used for maize, potatoes, and soybeans in mixed cultures. When

maize is grown alone or essentially alone I am told that 10 mounds

to the acre can be expected. Certainly this yield of about 820 pounds



K-2855. March 8, 1959. 3 miles east of Shillong.
Beds for potatoes, maize, and soybeans where
the burning is completed. Some natural re-
generation of pine.



K-2856. March 8, 1959. 3 miles east of Shillong.
Beds for potatoes, maize, and soybeans ready
for burning with sods in place. Some natural
regeneration of pine.

K-2855. March 8, 1959. 3 miles east of Shillong.
Beds for potatoes, maize, and soybeans where
the burning is completed. Some natural re-
generation of pine.

K-2856. March 8, 1959. 3 miles east of Shillong.
Beds for potatoes, maize, and soybeans ready
for burning with sods in place. Some natural
regeneration of pine.

cannot return a very good labor income. Much of the soil here has a dark yellowish-brown plowed surface and a yellowish-red or red B horizon.

Everything must be done in a great hurry I am told in order to make the next gate. This strongly rolling soil is nearly all cultivated. I am told that potatoes here normally give 70 maunds per acre in a 10-year cycle of 3 years in cultivation and 7 years in rest. Formerly the cycle was 18 years. Certainly it is too short now with fallows mostly of grass and scattered pine. On the easy slopes both the surface soil and the total soil are quite deep.

It is very cold now in this open jeep; and I can scarcely write because of the roughness of the road and three of us crowded into one seat.

With all of this cultivation and with grass in the fallows, there is serious erosion on the strong slopes; yet the amazing thing is that erosion is not worse.

I stop for just a moment to look at a place where the soil is fairly deep. Here the texture is loam to fine sandy clay loam. The soil seems to fall somewhere between Brown Forest and Yellow Latosol. I am told that potatoes have been grown here for around 60 to 70 years. Before that the Khasi people had practiced shifting cultivation for at least 200 to 300 years. These are mostly tribal lands, more or less attached to individual families by reason of continued occupation and use (K-2857).

cannot return a very good labor income. Much of the soil here has

a dark yellowish-brown plowed surface and a yellowish-red or red

B horizon.

Everything must be done in a great hurry I am told in order to

make the next gate. This strongly rolling soil is nearly all culti-

vated. I am told that potatoes here normally give 70 mannds per acre

in a 10-year cycle of 3 years in cultivation and 7 years in rest.

Formerly the cycle was 18 years. Certainly it is too short now with

fallows mostly of grass and scattered pine. On the easy slopes both

the surface soil and the total soil are quite deep.

It is very cold now in this open jeep; and I can scarcely write

because of the roughness of the road and three of us crowded into

one seat.

With all of this cultivation and with grass in the fallows, there

is serious erosion on the strong slopes; yet the amazing thing is that

erosion is not worse.

I stop for just a moment to look at a place where the soil is

fairly deep. Here the texture is loam to fine sandy clay loam. The

soil seems to fall somewhere between Brown Forest and Yellow Latosol.

I am told that potatoes have been grown here for around 60 to 70 years.

Before that the Khm̄r people had practiced shifting cultivation for

at least 200 to 300 years. These are mostly tribal lands, more or

less attached to individual families by reason of continued occupation

and use (K-2827).

At about 8-1/2 miles from Shillong, the soils are more nearly like Red Latosol. These are somewhat more eroded and there is now more pine forest. At 11 miles the soil is hilly Yellow Latosol, with patches of Red Latosol. There is considerable forest on them.

Now the Director speeds ahead in order to make the gate. The hills are very steep and the road is rough and winding.

Between the 17-1/2 and 2-1/2 mileposts the soil is very steeply sloping. Most of it is stony with outcrops besides. The cover is largely pine (Pinus khasiana) and grass with little cultivated soil. I see a few cattle.

After that, we go through strongly rolling Yellow Latosol with some steeply sloping stony areas. Here there is some soil under cultivation.

At 8:40 a.m. we come to the intermediate gate at Mawryngkneng. Now I discover that the Director does not know the hours of these gates and that we have been hurrying for no purpose. Such people who have no idea of time or place! It is no wonder that so little gets done.

As we pass the gate I see a bit of paddy in narrow valleys of local alluvium. But within a mile or so we are again in hilly areas of mixed Yellow and Red Latosol covered with thin stands of pine, scrubby oak, birch, and beech. It seems quite dry here now with very few springs. The road is very dusty. I notice a few small wattle plantings. The people here make charcoal for sale in Shillong. These soils are said to be very acid, low in phosphorus, and high fixers of added phosphorus. Here and there are both small and large areas of lowland paddy.

lowland paddy. At about 8-1/2 miles from Shillong, the soils are more nearly like Red Latosol. These are somewhat more eroded and there is now more pine forest. At 11 miles the soil is hilly Yellow Latosol, with patches of Red Latosol. There is considerable forest on them. Now the Director speeds ahead in order to make the gate. The hills are very steep and the road is rough and winding. Between the 17-1/2 and 2-1/2 mileposts the soil is very steeply sloping. Most of it is stony with outcrops besides. The cover is largely pine (Pinus khasiana) and grass with little cultivated soil. I see a few cattle. After that, we go through strongly rolling Yellow Latosol with some steeply sloping stony areas. Here there is some soil under cultivation. At 8:40 a.m. we come to the intermediate gate at Mawpyngkheng. Now I discover that the Director does not know the hours of these gates and that we have been hurrying for no purpose. Such people who have no idea of time or place! It is no wonder that so little gets done. As we pass the gate I see a bit of paddy in narrow valleys of local alluvium. But within a mile or so we are again in hilly areas of mixed Yellow and Red Latosol covered with thin stands of pine, scrubby oak, birch, and beech. It seems quite dry here now with very few springs. The road is very dusty. I notice a few small waste plantings. The people here make charcoal for sale in Shillong. These soils are said to be very acid, low in phosphorus, and high fixers of added phosphorus. Here and there are both small and large areas of

I'm told that there has been a road here only since about 1949. This road crosses, now and then, the old paved path about a yard wide that was used before they had a road for wheeled vehicles.

The soils continue to be mixed Yellow and Red Latosol. At about 30-1/2 miles south of east I see some of the terracing done by the Department of Agriculture on sloping Yellow Latosol (K-2858).

This seems a mighty little effort for all they had told me about their wonderful terracing. Time is short so I'll just take the photos now and get the specifications later.

In the lowlands are bunded areas for paddy (K-2859). The terraces are on individual farm holdings for maize, potatoes, soybeans, and phaseolus (a pulse) in mixed cultures. They use composted manure and a little fertilizer. I find it extremely hard to get precise information from these people. If I ask the Director the same question twice I am likely to get two different answers.

Then we cross a fairly wide valley for paddy with moderate side slopes, some of which are terraced a bit. We pass a small experiment station for sericulture. In places the soil along here is quite hilly and some spots are badly eroded.

At 38 miles we go down a winding road on the side of a steep escarpment and cross a stream bottom bunded for paddy that is about 1/4 to 1/2 mile wide.

On these steep slopes there is thin pine with more or less grass. At the moment, cattle are grazing on exceedingly steep slopes. In a few places there are rather feeble attempts at terraces.

I'm told that there has been a road here only since about

1949. This road crosses, now and then, the old paved path about

a yard wide that was used before they had a road for wheeled

vehicles.

The soils continue to be mixed Yellow and Red Latosol. At

about 30-1/2 miles south of east I see some of the terracing done

by the Department of Agriculture on sloping Yellow Latosol (K-2828).

This seems a mighty little effort for all they had told me

about their wonderful terracing. Time is short so I'll just take

the photos now and get the specifications later.

In the lowlands are banded areas for paddy (K-2829). The terraces

are on individual farm holdings for maize, potatoes, soybeans, and

phaseolus (a pulse) in mixed cultures. They use composted manure

and a little fertilizer. I find it extremely hard to get precise

information from these people. If I ask the Director the same question

twice I am likely to get two different answers.

Then we cross a fairly wide valley for paddy with moderate side

slopes, some of which are terraced a bit. We pass a small experiment

station for agriculture. In places the soil along here is quite hilly

and some spots are badly eroded.

At 38 miles we go down a winding road on the side of a steep

escarpment and cross a stream bottom banded for paddy that is about

1/4 to 1/2 mile wide.

On these steep slopes there is thin pine with more or less grass.

At the moment, cattle are grazing on exceedingly steep slopes. In a

few places there are rather feeble attempts at terraces.



K-2857. March 8, 1959. 7 miles southeast of Shillong. Distant view of hill cultivation at about 6,000 feet. Soil in right foreground resting since cultivation three years ago.



K-2858. March 8, 1959. 30.5 miles south of east of Shillong. Terraces with back slopes built by the Department of Agriculture.

K-2857. March 8, 1959. 7 miles southeast of Shillong.
Distant view of hill cultivation at about
6,000 feet. Soil in right foreground resting
since cultivation three years ago.

K-2858. March 8, 1959. 30.5 miles south of east of
Shillong. Terraces with back slopes built
by the Department of Agriculture.

Then we drive up another steep winding road and come to Jowai at 9:45. In these hills I see some schist, sandstone, and other sedimentaries. The rainfall is said to be 200 inches here.

We drive up to the rest house and the Director brings out tea and a light lunch.

Once settled I try to get the specifications for their terraces: The faces are about 3 to 4 feet high, maximum, and less on gentle slopes; the width is 6 to 30 feet depending on the slope; and the surfaces have a back slope of one-inch per foot. I am told that this work costs around Rs 600 to 1,000 per acre, including any voluntary labor of the cultivator's family. Wages are higher here than most other parts of India. I am told that the tribal men get Rs 3 per day and the women Rs 1-1/2.

It is said that now the subsidy is Rs 200 per acre, or 50 percent of the cost, whichever is less. These cost figures do not include the time of the technicians. They expect to reach a target in June of 600 acres in this district and 1,500 for the entire State. Some program! I think these costs are unreasonably high even for this kind of terrace; and I don't believe it is necessary to have these elaborate terraces on these kinds of soils. Of course, I cannot prove this but I believe that simple low, contour bunds, with permanent grass on the bunds to act as silt traps, might do quite well. Something like this might be possible for these tribal people. And if they worked, the program might be developed in terms of square miles instead of acres.

Then we drive up another steep winding road and come to Jowai

at 9:45. In these hills I see some schist, sandstone, and other

sedimentaries. The rainfall is said to be 200 inches here.

We drive up to the rest house and the Director brings out tea

and a light lunch.

Once settled I try to get the specifications for their terraces:

The faces are about 3 to 4 feet high, maximum, and less on gentle

slopes; the width is 6 to 30 feet depending on the slope; and the

surfaces have a back slope of one-inch per foot. I am told that

this work costs around Rs 600 to 1,000 per acre, including any

voluntary labor of the cultivator's family. Wages are higher here than

most other parts of India. I am told that the tribal men get Rs 3 per

day and the women Rs 1-1/2.

It is said that now the subsidy is Rs 200 per acre, or 50 percent

of the cost, whichever is less. These cost figures do not include

the time of the technicians. They expect to reach a target in June

of 600 acres in this district and 1,500 for the entire State. Some

program! I think these costs are unreasonably high even for this

kind of terrace; and I don't believe it is necessary to have these

elaborate terraces on these kinds of soils. Of course, I cannot

prove this but I believe that simple low, contour bunds, with

permanent grass on the bunds to act as silt traps, might do quite

well. Something like this might be possible for these tribal people.

And if they worked, the program might be developed in terms of square

miles instead of acres.

The Director is very talkative but hardly responsible. He both contradicts and interrupts himself as well as others. No wonder he was not given responsibility for all soil conservation. But certainly there must have been somewhere in Assam other candidates besides Mr. Majid and Mr. Jacob.

Mr. Kharsati says that the agricultural work is generally better outside the blocks than within the blocks. At the start, all the emphasis in the blocks was on amenities with very little on production. Now the program is a little better balanced. He says that the block people make too many promises that cannot be fulfilled and promulgate too many simple slogans.

Here near the rest house I see women carrying very heavy loads of crushed rock for the road up a steep slope. They use the conical baskets with the head band.

Then again I am told we must hurry for the opening of the gate here. We go through at 10:30 and start back on the same rough, winding, dusty mountain road. My guides call attention to the small check dams of rock in the stream that feeds the main valley of paddy here. These are very simple indeed.

We recross this valley and wind up the steep escarpment to the west. Here the hilly Yellow Latosols have poor wild grass and the few cattle are in poor flesh, probably because of the very high soil acidity and phosphorus deficiency. Undoubtedly these soils were low in minerals to begin with. But with grass under this high rainfall, and the grass annually burnt, further depletion is inevitable.

The Director is very calkative but hardly responsible. He both
contradicts and interrupts himself as well as others. No wonder he
was not given responsibility for all soil conservation. But certainly
there must have been somewhere in Assam other candidates besides
Mr. Majid and Mr. Jacob.

Mr. Kharsast says that the agricultural work is generally better
outside the blocks than within the blocks. At the start, all the
emphasis in the blocks was on amenities with very little on production.
Now the program is a little better balanced. He says that the block
people make too many promises that cannot be fulfilled and promulgate
too many simple slogans.

Here near the rest house I see women carrying very heavy loads
of crushed rock for the road up a steep slope. They use the conical
baskets with the head band.

Then again I am told we must hurry for the opening of the gate
here. We go through at 10:30 and start back on the same rough,
winding, dusty mountain road. My guides call attention to the small
check dams of rock in the stream that feeds the main valley of paddy
here. These are very simple indeed.

We recross this valley and wind up the steep escarpment to the
west. Here the hilly Yellow Latosols have poor wild grass and the
few cattle are in poor flesh, probably because of the very high soil
acidity and phosphorus deficiency. Undoubtedly these soils were low
in minerals to begin with. But with grass under this high rainfall,
and the grass annually burnt, further depletion is inevitable.

I am told that paddy in the small low places runs about 10 to 12 maunds per acre.

I try to photograph one of these small bunded areas of slightly sloping local alluvium (K-2859).

I notice that most of the Khasi men wear shorts or long brown pants and ordinary shirts with shawls for extra warmth. It appears that none of them wears dhotis, or other kinds of Indian dress. The women have bright saris for dress up and somber ones for work. They too wear shawls.

I stop also to photograph (color) some of these terraces being built with guidance from the Department of Agriculture on a Yellow Latosol in a colluvial position.

Further on I photograph in color a part of one of the old tribal graveyards. They have tall upright stone slabs for men and flat ones for women.

A few trucks loaded with oranges go west toward Shillong. Some one must have hauled these up a steep slope because my guides tell me that most of the citrus is grown at elevations of 1,000 to 3,000 feet.

The Director is a poor driver and on one of these curves has to stop for another vehicle, gets his feet tangled up, and comes close to backing over the precipitous slope. I take a dive out of the vehicle; but fortunately for the others who cannot, he gets it stopped with a good 12 inches to spare!

I am told that paddy in the small low places runs about 10 to 12 mounds per acre.

I try to photograph one of these small bounded areas of slightly sloping local alluvium (K-2859).

I notice that most of the Khasi men wear shorts or long brown pants and ordinary shirts with shawls for extra warmth. It appears that none of them wears dhotis, or other kinds of Indian dress. The women have bright saris for dress up and somber ones for work. They too wear shawls.

I stop also to photograph (color) some of these terraces being built with guidance from the Department of Agriculture on a Yellow Latexol in a colluvial position.

Further on I photograph in color a part of one of the old tribal graveyards. They have tall upright stone slabs for men and flat ones for women.

A few trucks loaded with oranges go west toward Shillong. Some one must have hauled these up a steep slope because my guides tell me that most of the citrus is grown at elevations of 1,000 to 3,000 feet.

The Director is a poor driver and on one of these curves has to stop for another vehicle, gets his feet tangled up, and comes close to backing over the precipitous slope. I take a dive out of the vehicle but fortunately for the others who cannot, he gets it stopped with a good 12 inches to spare!



K-2859. March 8, 1959. 33.5 miles south of east of Shillong. Typical small paddy area with a little hill cultivation in the background on Yellow Latosol from sandstone.



K-2860. March 8, 1959. 22 miles south of east of Shillong. View in the village of Mawryngkneng.

K-2859. March 8, 1959. 33.5 miles south of east of Shillong.
Typical small paddy area with a little hill cultiva-
tion in the background on yellow laterite from
sandstone.

K-2860. March 8, 1959. 32 miles south of east of Shillong.
View in the village of Nanyangkhong.

We come again to Mawryngkneng about 22 miles from Shillong. But since our guides don't know about the times we wait here from 11:50 to 12:15 (K-2860).

I decide that time doesn't make much difference and make some stops for photographs of the shifting cultivation and of the beds prepared for crops. (K-2861; K-2862; K-2863)

We go back on this same road to within 10 miles of Shillong and then turn off to the southwest on a still poorer road that takes us up into the very high land, over 6,000 feet. The uneroded soils appear to me to be Yellow Latosols with a slight trend toward Brown Forest. A high percentage of these strongly rolling soils is cultivated and many fields are now being prepared, mainly for potatoes.

I stop at one place and notice that the beds were reworked after burning and are quite a bit wider than the earlier ones that I had seen. These have only narrow ditches between them. These people have done a neat and thorough job of preparation with hand tools. I am told this field I am looking at was brought out of rest and prepared by burning wood, leaves, and so on about 5 years ago. They are now carrying onto the fields in their conical baskets black, well prepared compost for local application with the potato seed (K-2864). I am told that here near Shillong the rural population has increased so much that the period under fallow has become shorter and shorter until some fields are almost continually cultivated.

We come again to Mawngkheng about 22 miles from Shilong.

But since our guides don't know about the times we wait here from

11:50 to 12:15 (K-2860).

I decide that time doesn't make much difference and make some

stops for photographs of the shifting cultivation and of the beds

prepared for crops. (K-2861; K-2862; K-2863)

We go back on this same road to within 10 miles of Shilong and

then turn off to the southwest on a still poorer road that takes us

up into the very high land, over 6,000 feet. The unworked soils

appear to me to be Yellow Latosols with a slight trend toward Brown

Forest. A high percentage of these strongly rolling soils is culti-

vated and many fields are now being prepared, mainly for potatoes.

I stop at one place and notice that the beds were reworked after

burning and are quite a bit wider than the earlier ones that I had

seen. These have only narrow ditches between them. These people

have done a neat and thorough job of preparation with hand tools.

I am told this field I am looking at was brought out of rest and

prepared by burning wood, leaves, and so on about 2 years ago. They

are now carrying onto the fields in their conical baskets black, well

prepared compost for local application with the potato seed (K-2864).

I am told that here near Shilong the rural population has increased

so much that the period under fallow has become shorter and shorter

until some fields are almost continually cultivated.



K-2861. March 8, 1959. 15 miles east of Shillong. Views of shifting cultivation and prepared beds for mixed culture.



K-2862. March 8, 1959. 15 miles east of Shillong. Another view of shifting cultivation and prepared beds for mixed culture.

K-2861. March 8, 1959. 15 miles east of Shillong.
Views of shifting cultivation and prepared
beds for mixed culture.

K-2862. March 8, 1959. 15 miles east of Shillong. Another view
of shifting cultivation and prepared beds for mixed culture.



K-2863. March 8, 1959. About 7.5 miles southeast of Shillong.
Preparing for mixed cultures in beds now burning.



K-2864. March 8, 1959. 8 miles southeast of Shillong.
Preparing beds for potatoes at over 6,000 feet.
Soil prepared after rest 5 years ago. Compost
used with the potato seed.

K-2863. March 8, 1959. About 7.5 miles southeast of Shillong.
Preparing for mixed cultures in beds now burning.

K-2864. March 8, 1959. 8 miles southeast of Shillong.
Preparing beds for potatoes at over 6,000 feet.
Soil prepared after rest 5 years ago. Compost
used with the potato seed.

We continue up by "the peak" at 6,500 feet. Now it is cloudy and very cold. Then we wind around down in the town and get back in the hotel about 1:50 p.m. Probably I'll get warm again but it scarcely seems possible now.

After lunch I have the boy build a fire and get warm. After the trip my hands were so cold I could scarcely write. Now I go over the notes and correct the worst jiggles caused by the jeep.

This was an interesting trip. I am glad to have seen more of the Khasi agriculture. But the terracing program of the Department of Agriculture, so much talked about, is almost insignificant. The unskillful and erratic driving by the Director, combined with bad mountain roads, hurry, and cold wind, made this trip about as unpleasant, physically, as any I've had in a long time.

The district agricultural officer, Mr. Kharsati, who says he is a soil conservationist trained (?) at Oregon State, is quite unimpressive. And the Director is nervous and flighty. I tried to corroborate most of what they told me before accepting it. They both speak in generalities and find it hard to be specific.

The soils are mainly Yellow Latosols with some Red Latosols. In favored places, the soils on the low easy slopes and in coves grade a bit to Brown Forest. The steep areas are strongly lithosolic.

We continue up by "the peak" at 6,200 feet. Now it is cloudy

and very cold. Then we wind around down in the town and get back

in the hotel about 1:50 p.m. Probably I'll get warm again but it

scarcely seems possible now.

After lunch I have the boy build a fire and get warm. After

the trip my hands were so cold I could scarcely write. Now I go

over the notes and correct the worst jiggles caused by the jeep.

This was an interesting trip. I am glad to have seen more of

the Khazai agriculture. But the terracing program of the Department

of Agriculture, so much talked about, is almost insignificant. The

unskilled and erratic driving by the Director, combined with bad

mountain roads, hurry, and cold wind, made this trip about as un-

pleasant, physically, as any I've had in a long time.

The district agricultural officer, Mr. Khazai, who says he is

a soil conservationist trained (?) at Oregon State, is quite unimpressive.

And the Director is nervous and flighty. I tried to corroborate most

of what they told me before accepting it. They both speak in generalities

and find it hard to be specific.

The soils are mainly Yellow Latosols with some Red Latosols.

In favored places, the soils on the low easy slopes and in covers

grade a bit to Brown Forest. The steep areas are strongly lithologic.

Commonly the sandstone has been markedly laterized without changing the structure of the rock greatly, although it does become mottled. Exposed cuts then reharden although not so prominently as in the area seen yesterday where the rainfall is above 200 inches.

After a bit Basu, Digar, and Swer come in for talk. I am too tired to work after they leave and simply rest and read in front of the fire until dinner at 8:00 p.m. Then after dinner more of the same and early to bed.

Commonly the sandstone has been markedly faceted without

changing the structure of the rock greatly, although it does

become mottled. Exposed cuts then rendered although not so

prominently as in the area seen yesterday where the rainfall is

above 200 inches.

After a bit Basu, Dugar, and Swer come in for talk. I am

too tired to work after they leave and simply rest and read in

front of the fire until dinner at 8:00 p.m. Then after dinner more

of the same and early to bed.

LAND REFORM PLANS OPPOSED

Grave Doubts About Nagpur Resolutions

CONGRESS M.P.s MEET

From Our Special Representative

NEW DELHI, March 7.—Congress M.P.s meeting here for 2½ hours today, expressed grave doubts about the capacity of the administrative machinery to carry through the Nagpur resolutions on land reforms. Mr Nehru took the unusual rôle of a listener while these doubts were being expressed.

THE Congress Parliamentary Party meeting was originally to discuss the Budget proposals, but it was decided to discuss land reforms instead, in view of the doubts expressed by some members about the Nagpur resolutions. . .

Eight members of the party spoke though more than 20 had submitted their names. Although all the speakers declared that they supported the Nagpur resolutions, a number of them made rather critical remarks about certain aspects of cooperative farming, ceiling on land and the vesting of surplus land in panchayat cooperatives.

Members spoke with great vehemence on faults in the administration. They said that as the administrative machinery existed today, it would not be able to create the required climate for joint cooperative farming. Unless the Government could render better service to the tiller, they said, the peasant would not rely on it; and if the peasant did not rely on the Government, he would not be interested in forming cooperatives.

CONFUSION

The pattern of the speeches made today indicated that there was a certain amount of confusion among members about the implications of the Nagpur resolutions. The words joint farming and collective farming were used as synonyms by more than one member, though they had come fully prepared, some with statistics, to discuss the issue.

Many members, however, expressed their uneasiness in clear terms. It was, for instance, pointed out that the Second Plan had exempted large plantations from the ceiling provision, whereas the Nagpur resolutions had not said anything on this point. In this context, the fear was expressed that if a ceiling on land was not applied to all, the villager might get the impression that his "big brother" had been left untouched.

Another interesting suggestion was that the shape of ceilings should not be left to the State Governments, but the Centre should enforce a uniform pattern of ceilings for the entire country.

Some members were also sceptical about the results of handing over surplus land to cooperatives. It was feared that the mere suggestion of taking away land from the farmer would make him cautious in making investments on land, which would have its consequent effect on production. Others said ceilings should have followed, not preceded, a survey of available surplus land. Since this had not been done, the Planning Commission should declare what acreage of surplus land there was in the country.



ATTLE WEALTH

Great stress was laid on cattle wealth which, in the words of Mr M. V. Krishnappa, was neglected in the first two Plans. A member went to the extent of suggesting that India should have invested in cattle wealth rather than in big steel plants because cattle would have provided "manure, traction power and other power."

Dr Raghu Vira doubted the efficacy of "collective farming." He said that in Poland, when Gomulka gave freedom, many peasants walked out of the collective farms. He described the present trend in India as a drift towards "bureaucratic oligarchy." As he put it, India's problem was to reconcile the conflicting pulls of joint farming, individual liberty, a Welfare State and increased production.

Mr B. Das, a former Chief Minister of Orissa, said the country expected Mr Nehru and Acharya Vinoba Bhave to give a lead in solving its problems. Implementation of land reforms required a lot of work, and much would depend on how this work was tackled.

After the meeting Congress spokesmen expressed satisfaction at the "fearless manner" in which members had spoken, though they acknowledged the contradictory nature of some speeches.

The discussions on land reforms will be continued on March 14 and 15.

The Congress Parliamentary Party asked Mr V. Venkataramana to resign his Rajya Sabha seat. It confirmed the Congress executive's decision accepting Mr N. G. Ranga's resignation from the party secretaryship and Mr Venkataramana's resignation from the party.

March 9

I am up at 6:00 and have a leisurely tea and breakfast (K-2865). About 7:45 I drive out, along the road I took March 7, to the southwest of Shillong in order to photograph the interesting beds, terraces, and rock outcrops with the early morning shadows on them. The soils are lithosolic in the steep hills and the others are Red and Yellow Latosols (K-2866-71).

I also try for some pictures of people but I've never seen more camera-shy women than these Khasi women although one little girl poses nicely at a moment when I only have black-and-white film (K-2872) - (K-2873; K-2874).

We return to the hotel about 9:45. I leave my cameras and we go at 10:00 a.m. to the office of the Director of Agriculture, Mr. S. Majid. I try to get some statistics but the office has only one copy of a recent summary by the Statistical Office. This they loan me but I must return it tonight.

Some excerpts follow:

State area	329 lakh acres
------------	----------------

Cultivated area	54 lakh acres
-----------------	---------------

(Nine lakh acres or 15 percent are double cropped; and 19 percent of the cultivated area is irrigated.)

Cultivated land per capita:

In 1921	0.69 acre
---------	-----------

In 1951	0.59 acre
---------	-----------

March 9

I am up at 6:00 and have a leisurely tea and breakfast (K-2865). About 7:45 I drive out, along the road I took March 7, to the southwest of Shilong in order to photograph the interesting beds, terraces, and rock outcrops with the early morning shadows on them. The soils are lithosolic in the steep hills and the others are Red and Yellow Latosols (K-2866-71).

I also try for some pictures of people but I've never seen more camera-shy women than these Khasi women although one little girl poses nicely at a moment when I only have black-and-white film (K-2872) - (K-2873; K-2874).

We return to the hotel about 9:45. I leave my cameras and we go at 10:00 a.m. to the office of the Director of Agriculture, Mr. S. Majid. I try to get some statistics but the office has only one copy of a recent summary by the Statistical Office. This they loan me but I must return it tonight.

Some excerpts follow:

Cultivated area 54 lakh acres
State area 329 lakh acres

(Nine lakh acres or 15 percent are double cropped; and 19 percent of the cultivated area is irrigated.)

Cultivated land per capita:

In 1921	0.69 acre
In 1931	0.59 acre



K-2865. March 9, 1959. Shillong.
A glimpse of a part of the Pinewood Hotel.



K-2866. March 9, 1959. 6.5 miles southwest of Shillong.
Terraces on an old area of shifting cultivation.
Paddy in foreground.

K-2865. March 9, 1959. Shillong.
A glimpse of a part of the Pinewood Hotel.

K-2866. March 9, 1959. 6.5 miles southwest of Shillong.
Terraces on an old area of shifting cultivation.
Paddy in foreground.



K-2867. March 9, 1959. 8 miles southwest of Shillong.
Bunds for paddy and shifting hill cultivation
in the background.



K-2868. March 9, 1959. 8.5 miles southwest of Shillong.
Paddy in the foreground; some hill terraces and lazy
beds up and down the slope.

K-2867. March 9, 1959. 8 miles southwest of Shillong.
Bunds for paddy and shifting hill cultivation
in the background.

K-2868. March 9, 1959. 8.5 miles southwest of Shillong.
Paddy in the foreground; some hill terraces and laxy
beds up and down the slope.



K-2869. March 9, 1959. 9.5 miles southwest of Shillong.
Terraces and lazy beds near Millim village.



K-2870. March 9, 1959. 9.5 miles southwest of Shillong.
Paddy, with terraces and hill cultivation.

K-2869. March 9, 1959. 9.5 miles southwest of Shillong.
Terraces and lazy beds near Millin village.

K-2870. March 9, 1959. 9.5 miles southwest of Shillong.
Paddy, with terraces and hill cultivation.



K-2871. March 9, 1959. 10 miles southwest of Shillong.
Terraces on hill slopes.



K-2872. March 9, 1959. Outskirts of Shillong.
A little Khasi working girl.

K-2871. March 9, 1959. 10 miles southwest of Shillong.
Terraces on hill slopes.

K-2872. March 9, 1959. Outskirts of Shillong.
A little Khasi working girl.



K-2873. March 9, 1959. Outskirts of Shillong.
View of kitchen of better-than-average
Khasi home.



K-2874. March 9, 1959. Shillong.
In a good residential part of the city.

K-2873. March 9, 1959. Outskirts of Shillong.
View of kitchen of better-than-average
Khasi home.

K-2874. March 9, 1959. Shillong.
In a good residential part of the city.

Area of selected crops in lakh acres:

Food grains	44.50
Rice	42.10
Other cereals	0.56
Gram and pulses	1.84
Jute	3.33
Rape and mustard	2.87
Fruits and vegetables	3.52
Cotton	0.35
Sugarcane	0.63
Tea	3.86
Betelnut (arecanut)	0.91
Other condiments and spices	0.44
Other crops	1.70

Yields in pounds per acre, 1957-58:

Winter rice	896
Autumn rice	809
Jute	1,274
Potatoes	3,590

In glancing over these figures from which the above were copied, I note that the yields of crops varied quite widely from season to season, but differentially among crops. Unhappily, except for wet paddy, there are no reliable statistics of production in the hills under shifting cultivation. These are estimated and lumped with the others.

Area of selected crops in lakh acres:

Food grains	44.50
Rice	42.10
Other cereals	0.56
Gram and pulses	1.84
Jute	3.33
Rape and mustard	2.87
Fruits and vegetables	3.52
Cotton	0.32
Sugarcane	0.63
Tea	3.86
Betelnut (arecanut)	0.91
Other condiments and spices	0.44
Other crops	1.70

Yields in pounds per acre, 1957-58:

Winter rice	896
Autumn rice	809
Jute	1,274
Potatoes	3,290

In glancing over these figures from which the above were copied,

I note that the yields of crops varied quite widely from season to season, but differentially among crops. Unhappily, except for wet paddy, there are no reliable statistics of production in the hills under shifting cultivation. These are estimated and lumped with

the others.

I am given to understand again that after April 1 all soil conservation work will be under the present Conservator of Forests, Mr. Jacob, who will have the additional title of Director of Soil Conservation in the Ministry of Agriculture.

While we attempt to talk people come and go at a rate of about one every minute and a half. Their missions have nothing to do with this conference. The Director insists that I make suggestions for his work, but he and Dr. Basu talk on and the interruptions continue at the same rate.

The Director says that a little soil testing is being done but not as a part of the national scheme. He blames this, as he does all his other failures, on the people in Delhi. He says that breeding work is being done on rice, sugarcane, oil seeds, cotton, pineapples, palms, citrus, cashewnut, black pepper, cardamon, and ginger. (I doubt that many of my associates in agronomy would call his work "breeding," although I don't know; I did not see it.)

Along with this work he says some investigations are being made of soil management. Unhappily, as in many other tropical areas, this crop work is done at small, specialized, poorly staffed, half-starved stations. He says no work is being done on either maize or potatoes, nor is water management considered.

Now he tells me that the costs for terracing are not so high as the figures he gave me yesterday. (Of course, he is afraid that either Dr. Basu or I might have notes that Delhi wouldn't like.) Instead of

I am given to understand again that after April 1 all soil conservation work will be under the present Conservator of Forests, Mr. Jacob, who will have the additional title of Director of Soil Conservation in the Ministry of Agriculture.

While we attempt to talk people come and go at a rate of about one every minute and a half. Their missions have nothing to do with this conference. The Director insists that I make suggestions for his work, but he and Dr. Basu talk on and the interruptions continue at the same rate.

The Director says that a little soil testing is being done but not as a part of the national scheme. He blames this, as he does all his other failures, on the people in Delhi. He says that breeding work is being done on rice, sugarcane, oil seeds, cotton, pineapples, palms, citrus, cashewnut, black pepper, cardamom, and ginger. (I doubt that many of my associates in agronomy would call his work "breeding," although I don't know; I did not see it.)

Along with this work he says some investigations are being made of soil management. Unhappily, as in many other tropical areas, this crop work is done at small, specialized, poorly staffed, half-starved stations. He says no work is being done on either maize or potatoes, nor is water management considered. Now he tells me that the costs for terracing are not so high as the figures he gave me yesterday. (Of course, he is afraid that either Dr. Basu or I might have noted that Delhi wouldn't like.) Instead of

the Rs 600 to 1,000 per acre he told me yesterday he now says that the true figures are Rs 200 to 400. (The fact of the matter is when I press him, it is clear that the records are so poor that he has no idea what the costs really are.)

The door opens and in comes a Mr. Fleschner of the University of California, who is studying the pests of citrus in Assam. But this is a small matter; there were at least 19 earlier interruptions since the Director asked me to outline what they should do.

We continue in fits and starts. Actually this man is hopeless the way he allows his staff to dart in and out.

Between the interruptions, I stress the importance of studying the existing local practices in the hills to find out why burning the potato beds is helpful, and so on. For the proposed hill station, I recommend a conservation engineer, an agronomist who knows also about pastures, a soil scientist trained in plant nutrition as well, a horticulturist, a botanist who knows something about forestry, and, if possible, a soil physicist. I also recommend a simple fertilizer layout for tests on cultivators' fields to discover the general perimeter of the soil fertility problem, quite regardless of whether chemical fertilizers are to be used. I feel reasonably confident that phosphorus, nitrogen, calcium, magnesium, some of the trace elements, and perhaps lime are involved. Where deficiencies are critical, small amounts of chemicals can be dibbled in near the seed and better uses can be made of green manure, compost, and ashes. I also stress the need for work on soil moisture and amounts and methods of irrigation for intensive culture in small fields and gardens.

the Rs 600 to 1,000 per acre he told me yesterday he now says that the true figures are Rs 200 to 400. (The fact of the matter is when I press him, it is clear that the records are so poor that he has no idea what the costs really are.)

The door opens and in comes a Mr. Fleschner of the University

of California, who is studying the pests of citrus in Assam. But this is a small matter; there were at least 19 earlier interruptions since the Director asked me to outline what they should do. We continue in fits and starts. Actually this man is hopeless the way he allows his staff to dart in and out.

Between the interruptions, I stress the importance of studying the existing local practices in the hills to find out why burning the potato beds is helpful, and so on. For the proposed hill station, I recommend a conservation engineer, an agronomist who knows also about pastures, a soil scientist trained in plant nutrition as well, a horticulturist, a botanist who knows something about forestry, and, if possible, a soil physicist. I also recommend a simple fertilizer layout for tests on cultivators' fields to discover the general perimeter of the soil fertility problem, quite regardless of whether chemical fertilizers are to be used. I feel reasonably confident

that phosphorus, nitrogen, calcium, magnesium, some of the trace

elements, and perhaps lime are involved. Where deficiencies are critical,

small amounts of chemicals can be dipped in near the seed and better

uses can be made of green manure, compost, and ashes. I also stress

the need for work on soil moisture and amounts and methods of irriga-

tion for intensive culture in small fields and gardens.

After this much-interrupted conference Dr. Basu and I go to the office of Mr. Swer. Here things are nearly as bad with several people going in and out of a tiny office.

He says that before the British came and introduced potatoes, the tribal people grew millet, upland paddy, yams, and pumpkins under shifting cultivation in the hills. The first year after clearing they had mixtures of ^{rice} paddy and Job's tears (Coix lacryma-jobi); the second year they had mixtures of yams, pumpkins, and Luffa (a climbing herb); and the third year the restoration forest returned to remain for a long period.

He says that at the low elevations trees are lopped and not cut down so much as in the high hills.

Before partition between Pakistan and India many did not grow paddy; they traded citrus and other hill crops for paddy with the people in the plains that are now in Pakistan. Now they must grow paddy and other grains. This change, coupled with a big increase in population, partly by immigrants from Nepal and elsewhere, has brought great new pressure on these hill soils.

He says that the population of Assam as a whole has increased partly through the importation of some industrial workers and tea pickers.

He says that the hill people will not be "tea coolies" but that they will work in industry if they get a chance, provided that the industry is in the hills. They don't like the climate in the lowlands and they don't like to give up their tribal rights.

After this much-interrupted conference Dr. Basu and I go to the office of Mr. Swar. Here things are nearly as bad with several people going in and out of a tiny office. He says that before the British came and introduced potatoes, the tribal people grew millet, upland paddy, yams, and pumpkins under shifting cultivation in the hills. The first year after clearing they had mixtures of paddy and Job's tears (*Coix lacryma-jobi*); the second year they had mixtures of yams, pumpkins, and Luffa (a climbing herb); and the third year the restoration forest returned to remain for a long period.

He says that at the low elevations trees are lopped and not cut down so much as in the high hills.

Before partition between Pakistan and India many did not grow paddy; they traded citrus and other hill crops for paddy with the people in the plains that are now in Pakistan. Now they must grow paddy and other grains. This change, coupled with a big increase in population, partly by immigrants from Nepal and elsewhere, has brought great new pressure on these hill soils.

He says that the population of Assam as a whole has increased partly through the importation of some industrial workers and tea pickers.

He says that the hill people will not be "tea coolies" but that they will work in industry if they get a chance, provided that the industry is in the hills. They don't like the climate in the lowlands and they don't like to give up their tribal rights.

He says that the wage rates given us yesterday are in error. Three rupees for men is uncommon; the usual rate is 2 or 2-1/2.

Then at 12:15 we go to Mr. Jacob's office. What a rat race! After a bit of confusion about arrangements we call on Mr. K. C. Barva, Secretary of Forestry and Secretary of Revenue, in the new secretariat building. The halls here are simply crowded with messengers and uniformed peons.

Again Mr. Jacob does a lot of talking. I am now told that the lower hills are less populated because of elephants and other wild beasts as well as malaria.

The secretary says that Mr. Jacob will continue to report to him on forestry but will soon be reporting to the Secretary of Agriculture for soil conservation.

The Secretary says that the cropping pattern is too nearly uniform without regard to the soils. He hopes to see new crops and mixed cultures for the various local areas.

We range over a wide field here without too much interruption. We discuss land ceilings, the consolidation of fragmented holdings, and the prevention of further fragmentation, for which they have no law, and the opportunities for improving soil use in the hills.

I am back to the hotel at 1:35, have lunch and study my notes.

At 3:45 p.m. I go with several others to call on the Minister of Agriculture, Shri M. H. Choudhuri, in his office in the Assembly Hall. This office, like all others, has a coal fire in a small open fireplace. In a few moments the Minister comes in, obviously very tired from being on the floor all day defending his budget against the "cut motions" of the opposition.

He says that the wage rates given us yesterday are in error. These rupees for men is uncommon; the usual rate is 2 or 2-1/2. Then at 12:15 we go to Mr. Jacob's office. What a rat race! After a bit of confusion about arrangements we call on Mr. K. G. Narva, Secretary of Forestry and Secretary of Revenue, in the new secretariat building. The halls here are simply crowded with messengers and uniformed peons. Again Mr. Jacob does a lot of talking. I am now told that the lower hills are less populated because of elephants and other wild beasts as well as malaria. The secretary says that Mr. Jacob will continue to report to him on forestry but will soon be reporting to the Secretary of Agriculture for soil conservation. The Secretary says that the cropping pattern is too nearly uniform without regard to the soils. He hopes to see new crops and mixed cultures for the various local areas. We range over a wide field here without too much interruption. We discuss land ceilings, the consolidation of fragmented holdings, and the prevention of further fragmentation, for which they have no law, and the opportunities for improving soil use in the hills. I am back to the hotel at 1:35, have lunch and study my notes. At 3:45 p.m. I go with several others to call on the Minister of Agriculture, Shri M. H. Choudhury, in his office in the Assembly Hall. This office, like all others, has a coal fire in a small open fireplace. In a few moments the Minister comes in, obviously very tired from being on the floor all day defending his budget against the "cut motions" of the opposition.

We talk about the needs for research including the hill station already explained, an exploratory survey of nutrient deficiencies, a soil survey, and related work.

He says that the law provides for a land ceiling of 50 acres, regardless of any irrigation facilities, but there are exceptions for tea estates, cooperative sugarcane farms, and farms under mechanized cultivation. Then too, the tribal hill lands are exempted since they are held in common. The law is passed; rules are being formulated; people are now registering their holdings; and the land is to be taken over in the next year or so.

There is no law for the consolidation of fragmented holdings nor for preventing further fragmentation.

Now I am told that the flat paddy land within the hills is privately owned. (Added later: I think this must apply only to the large areas and not to the tiny field and garden patches, of which there are so many.)

The Minister tells me that although customs vary among the tribes, commonly the youngest daughter inherits everything. Only she remains in the ancestral home with her husband.

The Minister is a far cut above the others but since he is obviously very tired I return to the hotel about 5:00 p.m. On the way I buy a needle and thread. Then I sew a bit, have tea, and study my notes.

We talk about the needs for research including the hill station already explained, an exploratory survey of nutrient deficiencies, a soil survey, and related work.

He says that the law provides for a land ceiling of 50 acres, regardless of any irrigation facilities, but there are exceptions for tea estates, cooperative sugarcane farms, and farms under mechanized cultivation. Then too, the tribal hill lands are exempted since they are held in common. The law is passed; rules are being formulated; people are now registering their holdings; and the land is to be taken over in the next year or so.

There is no law for the consolidation of fragmented holdings nor for preventing further fragmentation.

Now I am told that the flat paddy land within the hills is privately owned. (Added later: I think this must apply only to the large areas and not to the tiny field and garden patches, of which there are so many.)

The Minister tells me that although customs vary among the tribes, commonly the youngest daughter inherits everything. Only she remains in the ancestral home with her husband.

The Minister is a far cut above the others but since he is obviously very tired I return to the hotel about 5:00 p.m. On the way I buy a needle and thread. Then I sew a bit, have tea, and study my notes.

The work here appears to be poorly coordinated and the staff is not strong. Jacob is energetic and talks big but I doubt that his performance in his new position will be average. Then too, his having two positions in different ministries will not help any.

Mr. Majid, the Director of Agriculture, is poorly trained, nervous, irritable, and jealous, and has little concept of his job.

A good research station for these hill problems is urgently needed. But can these people either staff or direct such a station? I doubt it.

At 8:00 I have dinner, then read by the fire, and go to bed early for the long day tomorrow.

The work here appears to be poorly coordinated and the staff

is not strong. Jacob is energetic and talks big but I doubt that

his performance in his new position will be average. Then too,

his having two positions in different ministries will not help

any.

Mr. Majid, the Director of Agriculture, is poorly trained,

nervous, irritable, and jealous, and has little concept of his job.

A good research station for these hill problems is urgently

needed. But can these people either staff or direct such a station?

I doubt it.

At 8:00 I have dinner, then read by the fire, and go to bed

early for the long day tomorrow.

March 10

I am up at 5:15 with breakfast at 6:00 and am ready to leave at 6:15. Then comes Digar, Basu, Biswas, and B. P. Gohian, an employee of the IARI located with the Department of Agriculture in Assam.

We leave in an automobile (sic) at 6:25. Only a few people are on the streets and they look cold. We need to wait a few minutes at the gate, 59 miles from Gauhati. We go on through at 6:50 and north on the same hilly, winding road we traveled on March 6. There are a great many trucks loaded with coal, logs, and timber.

Here and there one sees native houses near the top of high hills on the other side of the deep canyon that are reached only by foot paths. Certainly these people know how to climb hills. As we slip down the high pine-covered hills near Shillong I see again, after milestone 53.5, a part of the great area of nearly open grassland used as buffalo pasture. The annual burning must degrade the soil. Yet this grass is tough (I imagine even for the buffaloes) and one sees little active erosion now except for a few cultivated hill fields. The population seems quite dense here for hill land. Every little patch of soil that can possibly grow paddy is in beds; and some slopes are used in beds, presumably for maize and potatoes. In only a few places have the cultivators made reasonably good terraces.

We stop at 44.5 miles from Gauhati and walk a ways to the west of the road for me to see a proposed site for a hill research station on shifting cultivation. The strongly sloping to hilly soil has been long farmed by shifting cultivators. The present cover is mostly

March 10

I am up at 5:15 with breakfast at 6:00 and am ready to leave

at 6:15. Then comes Diger, Baan, Biswas, and B. P. Gohlan, an

employee of the IARI located with the Department of Agriculture

in Assam.

We leave in an automobile (sic) at 6:25. Only a few people

are on the streets and they look cold. We need to wait a few minutes

at the gate, 59 miles from Gauhati. We go on through at 6:50 and

north on the same hilly, winding road we traveled on March 6. There

are a great many trucks loaded with coal, logs, and timber.

Here and there one sees native houses near the top of high hills

on the other side of the deep canyon that are reached only by foot

paths. Certainly these people know how to climb hills. As we slip

down the high pine-covered hills near Shillong I see again, after

milestone 53.5, a part of the great area of nearly open grassland

used as buffalo pasture. The annual burning must degrade the soil.

Yet this grass is tough (I imagine even for the buffaloes) and one

sees little active erosion now except for a few cultivated hill fields.

The population seems quite dense here for hill land. Every little

patch of soil that can possibly grow paddy is in beds; and some

slopes are used in beds, presumably for maize and potatoes. In

only a few places have the cultivators made reasonably good terraces.

We stop at 44.5 miles from Gauhati and walk a ways to the west

of the road for me to see a proposed site for a hill research station

on shifting cultivation. The strongly sloping to hilly soil has been

long farmed by shifting cultivators. The present cover is mostly

weeds and grass. This cover has been burned again and again. There is not even any fair second-growth forest. Possibly a tank could be built but there is no certain water supply for irrigation.

Mr. Gohain leaves us here and will return to Shillong. I ask him to tell the Director that I don't think much of this place. The research station should have some fairly good forest and a dependable water supply.

We drive on through this heavily used hill land. There are even patches of pineapples on Red Latosols with slopes of 20 to 50 percent. Of course, this road has intensified culture along it. I see many more good trees some one to two miles away from the road. All along the edge of the pavement are bundles of wood and of grass neatly tied, waiting for the trucks.

At milestone 40 the soil is very steeply sloping and most of it has a fair to moderate second-growth forest with a few clearings on slopes of around 40 to 60 percent. (K-2875)

We are now well out of the sandstone influence and the soils are Red Latosols, or these intergrading to Reddish-Brown Latosol, from relatively basic granitic gneiss. The road builders have exposed some nice profiles of these soils. I am again amazed at their great depth on these strong slopes.

We come into Nongpoh, 30 miles south of Gauhati, and wait a few minutes for the gate to open. I am told that the elevation here is about 1,500 feet and the annual rainfall around 110 inches (K-2876).

weeds and grass. This cover has been burned again and again.

There is not even any fair second-growth forest. Possibly a

tank could be built but there is no certain water supply for

irrigation.

Mr. Gohain leaves us here and will return to Shillong.

I ask him to tell the Director that I don't think much of this

place. The research station should have some fairly good forest

and a dependable water supply.

We drive on through this heavily used hill land. There are

even patches of pineapples on Red Latosols with slopes of 20 to

50 percent. Of course, this road has intensified culture along

it. I see many more good trees some one to two miles away from

the road. All along the edge of the pavement are bundles of wood

and of grass neatly tied, waiting for the trucks.

At milestone 40 the soil is very steeply sloping and most of

it has a fair to moderate second-growth forest with a few clearings

on slopes of around 40 to 60 percent. (K-2875)

We are now well out of the sandstone influence and the soils

are Red Latosols, or these intergrading to Reddish-Brown Latosols.

from relatively basic granitic gneiss. The road builders have

exposed some nice profiles of these soils. I am again amazed at

their great depth on these strong slopes.

We come into Nongphol, 30 miles south of Gauhati, and wait a

few minutes for the gate to open. I am told that the elevation here

is about 1,500 feet and the annual rainfall around 110 inches (K-2876).



K-2875. March 10, 1959. 32.5 miles south of Gauhati. Terraces, trees, and pineapples (right) on Red Latosol from gneiss.



K-2876. March 10, 1959. 30 miles south of Gauhati. View at the edge of Nongpoh.

K-2875. March 10, 1959. 32.5 miles south of Gannett.
Terraces, trees, and pinesapples (right) on
Red latosol from Gannett.

K-2876. March 10, 1959. 30 miles south of Gannett.
View at the edge of Honeymoon.

We leave at 8:52 and continue to go down on the hilly, winding road. Then we climb and are down again in another valley. Much of the cover is fair second growth with a high proportion of bamboo on very hilly to steep Reddish-Brown Latosols (K-2877). Still the only exposed rock are some that can be seen where the ravines come out of the high hills. Only small patches are used for crops; and I see a few small areas planted to teak.

The vegetation becomes more luxuriant as we go down. Here too, are bundles of wood. These are made of small pieces some 2 to 4 inches in diameter and 3 feet long, bound together in bundles about 2 feet in diameter.

We pass some rather poor bananas on the valley slopes. After milestone 22 from Gauhati the regeneration forest is mostly bamboo thickets; although there are better trees on the very steep slopes that have never been cultivated.

We cross the Umtru River on a narrow bridge about 15.5 miles south of Gauhati. It is now quite warm. The cover is more scrubby. There is a little cultivation on the easy slopes and fair-sized banded paddy fields along the river. As we go on, I see more buffalo and other cattle. Apparently until quite recently these hilly soils had been more heavily used under shifting cultivation than now.

We pass the gate 11 miles from Gauhati at 9:37 (K-2878).

We leave at 8:52 and continue to go down on the hilly, winding

road. Then we climb and are down again in another valley. Much

of the cover is fair second growth with a high proportion of

bamboo on very hilly to steep Reddish-Brown Latosols (K-2877).

Still the only exposed rock are some that can be seen where the

ravines come out of the high hills. Only small patches are used

for crops; and I see a few small areas planted to teak.

The vegetation becomes more luxuriant as we go down. Here too,

are bundles of wood. These are made of small pieces some 2 to 4

inches in diameter and 3 feet long, bound together in bundles about

2 feet in diameter.

We pass some rather poor bananas on the valley slopes. After

milestone 22 from Gaharti the regeneration forest is mostly bamboo

thickets; although there are better trees on the very steep slopes

that have never been cultivated.

We cross the Umrin River on a narrow bridge about 12.5 miles

south of Gaharti. It is now quite warm. The cover is more scrubby.

There is a little cultivation on the easy slopes and fair-sized

pounded paddy fields along the river. As we go on, I see more buffalo

and other cattle. Apparently until quite recently these hilly soils

had been more heavily used under shifting cultivation than now.

We pass the gate 11 miles from Gaharti at 9:37 (K-2878).



K-2877. March 10, 1959. 18 miles south of Gauhati.
Characteristic bamboo thicket along the road.



K-2878. March 10, 1959. 9 miles south of Gauhati.
A Khasi home with bundles of cut bamboo
for sale.

K-2877. March 10, 1959. 18 miles south of Gannett.
Characteristic bamboo thicket along the road.

K-2878. March 10, 1959. 9 miles south of Gannett.
A Khast home with bundles of cut bamboo
for sale.

At 7 miles out of Gauhati we come into a village area on a slightly higher terrace than the very low one. Most of the soil is bunded for paddy and the poor houses are surrounded by scrubby trees and poor bananas. The soils are Low Humic Gley, well mottled below the surface. Then we drop just a bit onto the great alluvial plain ^{are} with clayey Low Humic Gley soils that are whitish in the surface. Here and there are small spurs and islands of the red hills and bits of both natural and man-made terraces some 4 to 6 feet high.

We pass the Assam Flour Mills and enter the scattered suburbs, and drive through the crowded streets. Then there is a long wait at the railway gate with no train in sight or hearing. No train does come but finally they open the gate.

We reach the airport at Borjhor, 12 miles mainly west of Gauhati, at 10:45 and discover that the plane will be late. When it comes, unloading is very slow. Finally we are in the air at 12:36 for Agartala.

At first we fly a bit west. I see many fresh borrow pits along the new highway grade with the usual little ridges and mounds left for measurement. Then we turn south over the hills. On the upper slopes are patches of jhumming and in the valleys bits of bunded paddy fields. Roads are rare and I see quite a few well-trodden footpaths.

Out about 35 miles I again see hilly land, cleared of forest and now mostly grass covered. The soil looks bare from the plane but now I know that it isn't. Here there are a few very winding roads. There is an enormous area of this nearly treeless hilly soil. As we go south, it becomes more stony, like the land I saw near Cherrapunji with the

At 7 miles out of Garhadi we come into a village area on a slightly higher terrace than the very low one. Most of the soil is banded for paddy and the poor houses are surrounded by scrubby trees and poor bananas. The soils are low Humic Gley, well mottled below the surface. Then we drop just a bit onto the great alluvial plain with clayey low Humic Gley soils that are whitish in the surface. Here and there are small spurs and islands of the red hills and bits of both natural and man-made terraces some 4 to 6 feet high. We pass the Assam Flour Mills and enter the scattered suburbs and drive through the crowded streets. Then there is a long wait at the railway gate with no train in sight or hearing. No train does come but finally they open the gate. We reach the airport at Borjhar, 12 miles mainly west of Garhadi, at 10:45 and discover that the plane will be late. When it comes, unloading is very slow. Finally we are in the air at 12:35 for Agartala. At first we fly a bit west. I see many fresh borrow pits along the new highway grade with the usual little ridges and mounds left for measurement. Then we turn south over the hills. On the upper slopes are patches of humming and in the valleys bits of banded paddy fields. Roads are rare and I see quite a few well-trodden footpaths. Out about 35 miles I again see hilly land, cleared of forest and now mostly grass covered. The soil looks bare from the plane but now I know that it isn't. Here there are a few very winding roads. There is an enormous area of this nearly treeless hilly soil. As we go south, it becomes more stony, like the land I saw near Cherrapunji with the

old rehardened lateritic sandstone. Then we pass even more rugged hills. On one very high knife-edged ridge, is a long village with jhum fields on the upper parts of slopes of 75 to 100 percent.

At 1:02 we are apparently passing over East Pakistan and the hills give way to plains. Parts of the plain are very dry, parts green with crop, and parts wet. As we go on, I see many winding muddy streams that give water for irrigation. And here, further east than I crossed March 5, one can see the relicts of the old ox-bows and braided streams. Even so, however, large areas of the plain have dry fields.

We come down at Agartala just a bit east of the plain, which is in Pakistan, at 1:35 p.m. The landscape is a complex of very low hills and bits of high terrace a few feet above both large and small winding valleys. These valleys have been leveled and banded for paddy. The dark reddish-yellow uplands are mostly in crop but some have a low scrubby cover of bushes and dwarf trees.

It is very hot and sunny here where we wait for the plain^{to} to unload.

We are in the air again at 2:11 and immediately cross into East Pakistan over dry paddy fields, and then over wet ones. Many of the villages here have one to several large square ponds with houses built around them. There are trees in the villages but not in the rest of the plain. Near the villages but apart from them are some individual houses with a pond and trees. The mosquitoes must love this place. The area is highly populated. Essentially all the land is cropped and much of it is double-- or triple-cropped.

old rehardened lateritic sandstone. Then we pass even more rugged hills. On one very high knife-edged ridge, is a long village with $\frac{1}{2}$ inch fields on the upper parts of slopes of 75 to 100 percent.

At 1:02 we are apparently passing over East Pakistan and the hills give way to plains. Parts of the plain are very dry, parts green with crop, and parts wet. As we go on, I see many winding muddy streams that give water for irrigation. And here, further east than I crossed March 5, one can see the relics of the old ox-bows and braided streams. Even so, however, large areas of the plain have dry fields.

We come down at Agarata just a bit east of the plain, which is in Pakistan, at 1:35 p.m. The landscape is a complex of very low hills and bits of high terrace a few feet above both large and small winding valleys. These valleys have been leveled and banded for paddy. The dark reddish-yellow uplands are mostly in crop but some have a low scrubby cover of bushes and dwarf trees.

It is very hot and sunny here where we wait for the plain to unload.

We are in the air again at 2:11 and immediately cross into East Pakistan over dry paddy fields, and then over wet ones. Many of the villages here have one to several large square ponds with houses built around them. There are trees in the villages but not in the rest of the plain. Near the villages but apart from them are some individual houses with a pond and trees. The mosquitoes must love this place. The area is highly populated. Essentially all the land is cropped and much of it is double- or triple-cropped.

We cross a fairly large, very winding muddy stream. The old ox-bows and channels become increasingly obvious. Some of the stream beds have shifted recently, and several villages are built in the shape of a half moon or other segments of ellipses apparently conforming to the older stream banks. In places the fields are long and narrow on one side of an old stream bed and short on the other. This suggests the gradual movement of the stream during which one farmer adds a bit each year or so to his field while his countryman on the opposite bank loses bits from his fields.

We cross what I take to be the highly braided Meghna River and the Padma River just above their joining. Even here most of the soil is cultivated yet only a little has green crops. As we go to the west I see other branches of the Padma going into the delta. (These are not branches in the normal sense but rather alternate channels.) Certainly there must be great floods on these streams and channels leading to the Bay of Bengal. Near the larger channels the flood plain is now sandy and waste with very poor cropland and very poor villages.

For some reason I find this trip very tiring. We go on into Calcutta over about the same kind of landscape I saw early March 5.

The wheels are down at 3:25. Unhappily, we are met by Indian soil surveyors of the Center stationed in Calcutta. By 3:50 we have the bags and our tickets confirmed. These boys insist that I visit their laboratory in a jeep but I prefer to have tea and remain here. I talk

We cross a fairly large, very winding muddy stream. The old

ox-bows and channels become increasingly obvious. Some of the

stream beds have shifted recently, and several villages are built

in the shape of a half moon or other segments of ellipses apparently

conforming to the older stream banks. In places the fields are long

and narrow on one side of an old stream bed and short on the other.

This suggests the gradual movement of the stream during which one

farmer adds a bit each year or so to his field while his countryman

on the opposite bank loses bits from his fields.

We cross what I take to be the highly braided Meghna River and

the Padma River just above their joining. Even here most of the soil

is cultivated yet only a little has green crops. As we go to the

west I see other branches of the Padma going into the delta. (These

are not branches in the normal sense but rather alternate channels.)

Certainly there must be great floods on these streams and channels

leading to the Bay of Bengal. Near the larger channels the flood

plain is now sandy and waste with very poor cropland and very poor

villages.

For some reason I find this trip very tiring. We go on into

Calcutta over about the same kind of landscape I saw early March 2.

The wheels are down at 3:25. Unhappily, we are met by Indian soil

surveyors of the Center stationed in Calcutta. By 3:50 we have the

bags and our tickets confirmed. These boys insist that I visit their

laboratory in a jeep but I prefer to have tea and remain here. I talk

with them for awhile and finally ask them how it is that soil surveyors are in the city during such nice weather for field work? They grin unsweetly.

I check in with the air people about 5:30 and the boys leave. This noisy station is unpleasant enough; but it is not a fraction of what a 30-mile jeep ride across crowded Calcutta and back would be.

A last rush of passengers delays our plane. We finally leave at 7:15. I have dinner and then alternate between reading and nodding.

We are down in Delhi at 10:45 p.m. Mommy meets me and I go on to the hotel while she waits for Mrs. Olaf Aamodt who comes in from Teheran on a later plane.

To bed at midnight, very tired indeed.

with them for awhile and finally ask them how it is that soil

surveyors are in the city during such nice weather for field

work? They grin unawestly.

I check in with the air people about 5:30 and the boys leave.

This noisy station is unpleasant enough; but it is not a fraction

of what a 30-mile jeep ride across crowded Calcutta and back would be.

A last rush of passengers delays our plane. We finally leave

at 7:15. I have dinner and then alternate between reading and nodding.

We are down in Delhi at 10:45 p.m. Mommy meets me and I go on

to the hotel while she waits for Mrs. Olaf Amund who comes in from

Teheran on a later plane.

To bed at midnight, very tired indeed.

March 11

After breakfast I work in my room on my last trip report.
Then lunch and back to reports.

At 8:00 p.m. we go to a dinner given the team and others by Mr. and Mrs. D. Damle, Secretary of the Union Ministry of Food and Agriculture in Hyderabad House. Partly interesting but mostly dull.

March 12

This morning I go to the office for a somewhat confused discussion of schedules and alternative outlines, together with some discussions of the food-grain targets.

Targets of food-grain production:

(Year)	(Million tons)
1949-50 Base year of First Plan	57.9
1955-56 End of First Plan	65.5
1960-61 End of Second Plan	80.5
1965-66 End of Third Plan	100 to 110

After lunch I write and dictate sections for the draft report.
Then dinner, a back treatment, and to bed.

March 11

After breakfast I work in my room on my last trip report.

Then lunch and back to reports.

At 8:00 p.m. we go to a dinner given the team and others by

Mr. and Mrs. D. Damsie, Secretary of the Union Ministry of Food and Agriculture in Hyderabad House. Partly interesting but mostly

dull. A very good of statistics data was given. We finally leave

March 12

This morning I go to the office for a somewhat confused discussion of schedules and alternative outlines, together with some discussions of the food-grain targets.

Targets of food-grain production:

(Year)	(Million tons)
1949-50 Base year of First Plan	27.9
1952-56 End of First Plan	65.5
1960-61 End of Second Plan	80.5
1965-66 End of Third Plan	100 to 110

After lunch I write and dictate sections for the draft report.

Then dinner, a back treatment, and to bed.

March 13

Breakfast, and then again on the draft report. After lunch, Mr. Huffman and I have a brief session with Mr. Naik, Joint Secretary in the Ministry of Community Development.

He tells me that before Community Development there were not agricultural officers at the lower levels. I remind him that they had them in West Bengal, so he continues, "except in a few States." He says that it was agreed that the methods of agriculture were well known and that the problem was extension. (This common fallacy that successful farming in India results from the use of a few simple techniques is a current handicap of great proportions.) He thinks now that the village-level workers spend too much time on supplies and that the cooperatives will take over these functions. (This is another fallacy for the immediate future. There are very few operating cooperative societies and it will be a big job to get good ones in operation.)

He says they need to develop local organizations to make the program more fully a "people's program" with two main objectives: (1) better uses of resources for food, and (2) the development of local democratic institutions.

We continue a general discussion of the problems of training and administration. He adds nothing new beyond the "official line" I have heard from Minister Dey, Carl Taylor, and the others. Actually I doubt that he has spent much time in the field except for office visits, training sessions, and the like. He certainly does not understand the problems within the blocks.

March 13

Breakfast, and then again on the draft report. After lunch,

Mr. Hufman and I have a brief session with Mr. Naik, Joint

Secretary in the Ministry of Community Development.

He tells me that before Community Development there were not

agricultural officers at the lower levels. I remind him that they

had them in West Bengal, so he continues, "except in a few States."

He says that it was agreed that the methods of agriculture were well

known and that the problem was extension. (This common fallacy that

successful farming in India results from the use of a few simple

techniques is a current handicap of great proportions.) He thinks

now that the village-level workers spend too much time on supplies

and that the cooperatives will take over these functions. (This is

another fallacy for the immediate future. There are very few opera-

ting cooperative societies and it will be a big job to get good ones

in operation.)

He says they need to develop local organizations to make the

program more fully a "people's program" with two main objectives:

(1) better uses of resources for food, and (2) the development of

local democratic institutions.

We continue a general discussion of the problems of training

and administration. He adds nothing new beyond the "official line"

I have heard from Minister Bey, Carl Taylor, and the others. Actually

I doubt that he has spent much time in the field except for office

visits, training sessions, and the like. He certainly does not under-

stand the problems within the blocks.

About 3:00 p.m. I return to the hotel and complete a rough draft of the section of the report on soil and water conservation, except for the parts on irrigation and drainage being prepared by Omer Kelley.

After dinner Mommy completes the typing of it.

I fear that the strong talk about pushing cooperatives and the glowing promises of how they will shortly help the cultivators by Mr. Nehru and others will kick back at this government and the Congress Party. The present administration simply cannot do a significant fraction of what they claim about cooperatives and joint farming. Their strong talk is quite close to the Communist line. When they fail, and especially when Nehru is gone, the Communists will have a field day with the arguments and promises Nehru is now giving and the inevitable failure of the Congress Party to follow through.

And so to bed.

About 3:00 p.m. I return to the hotel and complete a rough draft of the section of the report on soil and water conservation, except for the parts on irrigation and drainage being prepared by

Omer Kelley.

After dinner Mommy completes the typing of it. I fear that the strong talk about pushing cooperatives and the glowing promises of how they will shortly help the cultivators by Mr. Nehru and others will kick back at this government and the Congress Party. The present administration simply cannot do a significant fraction of what they claim about cooperatives and joint farming. Their strong talk is quite close to the Communist line. When they fail, and especially when Nehru is gone, the Communists will have a field day with the arguments and promises Nehru is now giving and the inevitable failure of the Congress Party to follow through.

And so to bed.

March 14

Mommy is up at 4:45 and leaves about 5:30 for a trip to Agra with Mrs. Aamodt. I doze a bit, have tea, and read other trip reports.

After breakfast I read over my material, make a few additions, and take it to the office for mimeographing.

After lunch I work on the Assam notes until 3:00. Then comes Mr. Bishan Mansingh, a farmer of the U.P., to discuss soil conservation. He is fairly sound on most of his ideas but he says that he cannot get people to listen to him. Even the Prime Minister doesn't refuse him but doesn't give him a date for a conference. His own ideas are better than those he has copied from H. H. Bennett and others with an emotional approach.

At 3:40 p.m. Dr. Parker brings in Major Sando, who up to now has been in charge of the Tarai State Farm. (I'm told that because of politics he is leaving Tarai State Farm.) Now he is to be in charge of a huge resettlement project ^{about} within some 80,000 square miles. This area includes contiguous parts of Orissa, Madhya, Pradesh, and Andhra Pradesh.

They expect to settle 3,000,000 refugees from West Bengal. The area, he says, is wooded and rolling. The first idea was to clear out the forest and establish the usual farms. Of course, I don't know what the soils are but I suspect they are infertile and strongly lateritic. We seem to agree that a better approach would be to give

lateritic. We seem to agree that a better approach would be to give out the forest and establish the usual farms. Of course, I don't know what the soils are but I suspect they are infertile and strongly lateritic. The first idea was to clear area, he says, is wooded and rolling. They expect to settle 3,000,000 refugees from West Bengal. The

Andhra Pradesh.

This area includes contiguous parts of Orissa, Madhya Pradesh, and charge of a huge resettlement project within some 80,000 square miles. of politics he is leaving Tarai State Farm. Now he is to be in has been in charge of the Tarai State Farm. (I'm told that because

At 3:40 p.m. Dr. Parker brings in Major Sando, who up to now

others with an emotional approach.

Ideas are better than those he has copied from H. H. Bennett and

refuse him but doesn't give him a date for a conference. His own

cannot get people to listen to him. Even the Prime Minister doesn't action. He is fairly sound on most of his ideas but he says that he

Mr. Blahan Manasingh, a farmer of the U.P., to discuss soil conser-

After lunch I work on the Assam notes until 3:00. Then comes

and take it to the office for mimeographing.

After breakfast I read over my material, make a few additions,

reports.

with Mrs. Asmold. I do a bit, have tea, and read other trip

Monday is up at 4:45 and leaves about 5:30 for a trip to Agre

March 14

first emphasis on transport. The people then could be employed in partial cutting of the rolling areas and the gradual substitution of tree-containing mixed cultures on the sloping land. The low easy slopes and valley bottoms can be bunded for grains and pulses. He and Dr. Parker are very anxious for me to visit this area if time can be found.

Then at 4:00 p.m. comes a young man from the Consulate General of Viet Nam. (Added later: I had had this appointment with the Consul General, Mr. Do Vang Ly. At first I had assumed this young man was he but apparently he is his assistant.) He presents me with a formal invitation from his government for me to stop in Saigon to look at an area of soil planned for drainage. (Dr. Bradfield had written me earlier that he hoped I could do this because he fears that the soils are cat clays. If so, the scheme would fail.) Now this invitation comes just as our reservations have been confirmed! I tell him I will let him know next Monday afternoon.

Then Dr. Parker comes again and insists that I visit this settlement scheme. He says that probably the GOI will listen to me and I can prevent a catastrophe.

After all this I go out in the garden to get away from the telephone and to wait for Mommy who is supposed to come by dark. But it is almost dark now, and no Mommy.

She comes a bit after 7:00 p.m. Then at 7:30 we see the Parkers off on their way to Rome.

Then dinner, back treatment, notes, and to bed.

first emphasis on transport. The people then could be employed in partial cutting of the rolling areas and the gradual substitution of tree-containing mixed cultures on the sloping land. The low easy slopes and valley bottoms can be bounded for grains and pulses. He and Dr. Parker are very anxious for me to visit this area if time can be found.

Then at 4:00 p.m. comes a young man from the Consulate General of Viet Nam. (Added later: I had had this appointment with the Consul General, Mr. Do Vang Ly. At first I had assumed this young man was he but apparently he is his assistant.) He presents me with a formal invitation from his government for me to stop in Saigon to look at an area of soil planned for drainage. (Dr. Bradfield had written me earlier that he hoped I could do this because he fears that the soils are cat clays. If so, the scheme would fail.) Now this invitation comes just as our reservations have been confirmed! I tell him I will let him know next Monday afternoon.

Then Dr. Parker comes again and insists that I visit this settlement scheme. He says that probably the GOI will listen to me and I can prevent a catastrophe.

After all this I go out in the garden to get away from the telephone and to wait for Mommy who is supposed to come by dark. But it is almost dark now, and no Mommy.

She comes a bit after 7:00 p.m. Then at 7:30 we see the Parkers off on their way to Rome. Then dinner, back treatment, notes, and to bed.

March 15 (Sunday)

I work on notes all day. Major Sando calls me in the forenoon to break his appointment for 3:00 p.m. He said the Secretary wanted to check with the Minister about arrangements for my visit to Orissa.

About 5:45 we all go to the Ensmingers for a buffet dinner. Dinner is very good and the evening pleasant. We are back in our room at 9:00 p.m., notes for awhile, and then to bed.

March 16

This morning we have a brief meeting of the team. We all get copies of those draft reports that are mimeographed and then adjourn for all day to read them! I return to the hotel and finish the reading by lunch time.

In the afternoon I work on the notes for this India Journal. Mommy and I have dinner with Sir John Dunlap, who has been in India from time to time since 1920. He claims to have discovered some coal deposits developed by his family. He is here now trying to recover something of what he feels is owed him from their nationalization. He hopes he is near the end of long drawn-out negotiations. He is very British and does not agree that Britain could have prevented the partition of India. He insists that Hindu extremists caused the rift between Hindus and Moslems. He abhors the suggestion that Britain played one group off against the other.

I then have a back treatment and go to bed.

March 12 (Sunday)

I work on notes all day. Major Sando calls me in the forenoon to break his appointment for 3:00 p.m. He said the Secretary wanted to check with the Minister about arrangements for my visit to Orissa.

About 5:45 we all go to the Benningers for a buffet dinner.

Dinner is very good and the evening pleasant. We are back in our

room at 9:00 p.m., notes for awhile, and then to bed.

March 16

This morning we have a brief meeting of the team. We all get copies of those draft reports that are mimeographed and then adjourn for all day to read them! I return to the hotel and finish the reading by lunch time.

In the afternoon I work on the notes for this India Journal.

Mommy and I have dinner with Sir John Duniap, who has been in India from time to time since 1920. He claims to have discovered some coal deposits developed by his family. He is here now trying to recover something of what he feels is owed him from their nationalization. He hopes he is near the end of long drawn-out negotiations. He is

very British and does not agree that Britain could have prevented the partition of India. He insists that Hindu extremists caused the rift between Hindus and Moslems. He abhors the suggestion that Britain played one group off against the other.

I then have a back treatment and go to bed.

16 March, 1959.

1/FTLS
Dear Dr. Kellogg,

As instructed by our Government, we have the honour to convey our Government's invitation to you to visit Viet-Nam on your way to Bangkok and Hong Kong.

Please let us know if this proposal falls within your program and that you will be able to accept our invitation. We would further request that you will intimate to us details of your plane ticket booking so that we may inform our Government in time.

Yours sincerely,



For the Consul General
& b.o.

Dr. Ch. Kellogg,
Claridge's Hotel,
Room 107.
New Delhi.

March 17

We all meet at the office to discuss the first drafts for a report. Many of them were hastily thrown together without recommendations. We waste much of our time at these meetings. Because of apparent uncertainty we spend a lot of time listening to small talk. Because the drafts are still vague and lack recommendations, the discussion wanders. The subjects are very interesting; but not today's discussion.

During lunch time I prepare a letter to the Consul General of Viet Nam about my proposed visit. Then I call and the same young man agrees to come to the hotel at 6:00 p.m.

We meet in the office after lunch. The drafts seem more vague as we go on.

I return to the hotel at 6:00 and confer with the young man from the Consulate General of Viet Nam about my proposed visit to Saigon. Fortunately, Mommy had worked out a very good itinerary with the office of American Express.

In the evening we go with some others for dinner chez Howard Beers. The dinner is good and I have a pleasant talk with Dr. Cummings.

We are back to the room at 10:30 and to bed.

March 17

We all meet at the office to discuss the first drafts for a report. Many of them were hastily thrown together without recommendations. We waste much of our time at these meetings. Because of apparent uncertainty we spend a lot of time listening to small talk. Because the drafts are still vague and lack recommendations, the discussion wanders. The subjects are very interesting; but not today's discussion.

During lunch time I prepare a letter to the Consul General of Viet Nam about my proposed visit. Then I call and the same young man agrees to come to the hotel at 6:00 p.m.

We meet in the office after lunch. The drafts seem more vague

as we go on.

I return to the hotel at 6:00 and confer with the young man from the Consulate General of Viet Nam about my proposed visit to Saigon. Fortunately, Mommy had worked out a very good itinerary with the office of American Express.

In the evening we go with some others for dinner chez Howard Beers.

The dinner is good and I have a pleasant talk with Dr. Cummings.

We are back to the room at 10:30 and to bed.

March 18

This morning we continue on the slow and tedious process of discussing the draft sections for a report.

At 11:45 I go to the Planning Commission at their request for a detailed discussion of the measures I recommended a year ago for licensing the removal of soil for making bricks in order to reduce the enormous spoilage of excellent soil.

Mr. Ameer Reza, Joint Secretary of the Planning Commission, serves as chairman of the group. He seems to be a very able and pleasant man. I understand that he was a dedicated and close associate of Mahatma Gandhi.

I again go over the details of why, when, and where shallow diggings damage the soil and how it can be prevented. (This problem is explained in India Journal, 1958.)

It comes out that action is being taken partly because of recent prompting from the Prime Minister. Not long ago he was out driving near Delhi, remembered my report, and asked why this wastage was not stopped.

Then we discuss two other broad problems: (1) Poor coordination of highway, railway, and canal planning with the result that grades block the natural drainage, and (2) the vital need of coordination between plans for land consolidation and those for water control and conveyance structures.

March 18

This morning we continue on the slow and tedious process of

discussing the draft sections for a report.

At 11:45 I go to the Planning Commission at their request for

a detailed discussion of the measures I recommended a year ago for

licensing the removal of soil for making bricks in order to reduce

the enormous spoilage of excellent soil.

Mr. Amer Reza, Joint Secretary of the Planning Commission,

serves as chairman of the group. He seems to be a very able and

pleasant man. I understand that he was a dedicated and close associate

of Mahatma Gandhi.

I again go over the details of why, when, and where shallow diggings

damage the soil and how it can be prevented. (This problem is explained

in India Journal, 1958.)

It comes out that action is being taken partly because of recent

prompting from the Prime Minister. Not long ago he was out driving

near Delhi, remembered my report, and asked why this wastage was not

stopped.

Then we discuss two other broad problems: (1) Poor coordination

of highway, railway, and canal planning with the result that grades

block the natural drainage, and (2) the vital need of coordination

between plans for land consolidation and those for water control and

conveyance structures.

In the afternoon we continue discussion of the draft reports. Those submitted by the extension members of our team are negatively written and in such poor taste that the Indian administrators would be terribly irritated without knowing what they should do. I make several suggestions about recasting this section and making specific recommendations that I hope the authors can accept.

After dinner notes on the Journal, back treatment, and to bed.

March 19

As a result of our discussions I pull three subsections from my draft report and prepare them in more detail for separate treatment as sections. So I work all day on (1) Chemical fertilizers, (2) Consolidation of fragmented holdings, and (3) A public works program for food production. Mommy types as I write. I deliver these for mimeographing late in the afternoon.

Then dinner at 7:45, back treatment, and to bed.

March 20

From early morning until 6:30 p.m. I work on the section of the report on Soil and water conservation and Mommy types as I go along.

At 7:30 we have dinner chez Dr. Dorothy Parker. Dinner is very late but nice when it comes. The other guests are Mr. and Mrs.

Robert Engel, Mr. and Mrs. I. D. Wilson, and Mr. Jack Dalton.

We are back for bed at 11:00.

In the afternoon we continue discussion of the draft reports. Those submitted by the extension members of our team are negatively written and in such poor taste that the Indian administrators would be terribly irritated without knowing what they should do. I make several suggestions about recasting this section and making specific recommendations that I hope the authors can accept. After dinner notes on the Journal, back treatment, and to bed.

March 19

As a result of our discussions I pull three subsections from my draft report and prepare them in more detail for separate treatment as sections. So I work all day on (1) Chemical fertilizers, (2) Consolidation of fragmented holdings, and (3) A public works program for food production. Mommy types as I write. I deliver these for mimeographing late in the afternoon.

Then dinner at 7:45, back treatment, and to bed.

March 20

From early morning until 6:30 p.m. I work on the section of the report on Soil and water conservation and Mommy types as I go along. At 7:30 we have dinner chez Dr. Dorothy Parker. Dinner is very late but nice when it comes. The other guests are Mr. and Mrs. Robert Engel, Mr. and Mrs. I. D. Wilson, and Mr. Jack Dalton. We are back for bed at 11:00.

3/19/59

PUBLIC WORKS PROGRAMS FOR FOOD PRODUCTION.

Since India has the twin problems of food scarcity and unemployment, excellent possibilities exist for employment on public works that have an immediate effect on food production. Such projects should be strictly limited to those (1) for which people with the necessary skills for supervision are available or in training, (2) that will have an immediate effect on food production (including preservation), and (3) that require the very minimum of scarce materials and little or no foreign exchange.

By thus limiting these public works to those having an immediate effect on food production, the expenditures would have essentially no inflationary effect.

The outstanding example of such a possibility is contour bunding and terracing, including masonry terracing, where villagers agree on a complete system, accurately laid out in relation to contours and slopes.

Much skill in this work exists in India. Training for local supervisors could be rapidly expanded. The work can be done with a minimum of heavy machinery and furnish employment to many. Large and immediate increases

in food production and village income result from such work well done where cultivators are prepared to use the other good farming practices necessary for full effectiveness. The works have a lasting value.

As people can be trained and the work organized, other soil and water conservation measures can also be taken up on the same basis and for the same general reasons. These include land levelling for effective irrigation, field and village irrigation canals, and drainage ditches.

The construction of godowns in villages for secure storage of food crops and for orderly marketing could also contribute to effective food production and the prevention of losses.

The construction of those minimum-quality farm-to-market roads necessary for the obtaining of supplies and for marketing of products could also be included, provided that such road improvements do not go beyond the needs for food production.

1. It is recommended that careful consideration be given to a large public works program for works that result in immediate increases in food production, that require a

minimum of scarce materials or machines, and for the supervision of which skilled technicians are available or in training. Contour bunding and terracing could be expanded at once, and other works with a period for supervisor training. It is emphasized that employment on these works should be limited to those giving immediate increases in food production and thus not contribute to inflation.

3/19/59

CONSOLIDATION OF FRAGMENTED HOLDINGS.

The fragmentation of holdings reduces the efficiency of soil management and especially of water management. On many millions of acres, food production can be increased several fold by appropriate bunding and terracing, but only if these structures are placed correctly in relation to the contour. The types of bunds, or terraces to use vary, of course, with the kind of soil.

Land consolidation is going ahead in several States. Some of the results have been excellent in terms of increased food production, higher incomes, and reduced erosion. Unhappily, some programs are not coordinated with those for irrigation, drainage, and bunding in order to get the minimum lengths of the necessary structures in the places needed for greatest effectiveness and economy. But good coordination can be achieved and has been achieved successfully in Indian villages.

By carrying on land consolidation with soil and water conservation planning, land areas can be laid out so that field irrigation canals, drainage ditches, contour bunds, and masonry terraces are on the boundaries among holdings, or parts of holdings. Such locations of field boundaries

are very important. It is not always necessary or even desirable to bring all the land of one holder into a single block, especially where two or more contrasting soils of unlike management requirements are involved. It is more desirable to bring together those fragments of holdings that have similar soil.

Since land consolidation requires a satisfactory settlement of tenure problems, prompt action on all phases of tenure and land ceilings is urgently needed.

Because of the obvious benefits from land consolidation, if carried out with full regard to the needs for soil and water conservation, a definite schedule should be worked out to complete the job, village by village, by the end of the Third Plan.

Immediate steps should be taken (1) to initiate soil surveys and topographic surveys where needed, ahead of planning with highest priority to areas of contrasting soils and (2) to develop high-level coordinating mechanisms in each State to insure that planning for land consolidation takes full account of any needed field structures for irrigation, drainage, and contour bunds. In fact, a poor job of planning, may result in few benefits and great confusion later when a proper scheme is attempted.

With full coordination in the planning, once work begins in a village it should be pushed forward rapidly and concurrently with the soil and water conservation work to avoid any undue disturbance of current production and to get the advantages of the improved system as soon as possible.

1. It is urgently recommended that firm plans be developed immediately to schedule the completion of the consolidation of fragmented holdings, village-by-village, by the end of the Third Plan, based upon sound soil surveys and a coordinated plan for the boundaries of holdings to fall on the same lines as drainage ditches, irrigation canals, contour bunds, masonry terraces, and similar structures. It is further recommended that high-level coordinating mechanisms be established at the Center and in each State to develop schedules and to insure effective coordination with the requirements for soil and water conservation with special emphasis on needed structures for water control, distribution, and disposal.

Some States now have laws for undertaking land consolidation. But few, if any, have laws to prevent further uneconomic fragmentation. Several countries have such laws and they are as urgently needed in India.

2. It is recommended that draft legislation be put forward to prevent fragmentation of small holdings into tiny uneconomic units.

March 21

In the morning we write letters about my forward itinerary, which has now been confirmed, and then work on the Soil and Water Conservation section of the report until 8:15 p.m. when we go to a delegation dinner party for our American friends in Delhi, at the Ashoka Hotel. This is quite a party with dancing, floor shows, and all the rest of it. But I am afraid my years are beginning to show to say nothing of my arthritis.

We are back to bed about 12:30.

March 22 (Sunday)

This morning Dr. Kelley brings in his part of the report on Soil and water conservation that I had marked up pretty badly yesterday, but now he has it in quite good shape. Mommy types odd bits and we put the whole thing together and reedit it from beginning to end. About 3:00 p.m. we finish this long second draft and turn it in for mimeographing.

On this short trip to the office and back I appreciate more than ever our air-conditioned room. The air temperature is about 95° to say nothing of the scorching sun.

In the afternoon I start reading some of the other second-draft reports. Then dinner, bake my back, and to bed.

March 21

In the morning we write letters about my forward itinerary, which has now been confirmed, and then work on the Soil and Water Conservation section of the report until 8:15 p.m. when we go to a delegation dinner party for our American friends in Delhi, at the Ashoka Hotel. This is quite a party with dancing, floor shows, and all the rest of it. But I am afraid my years are beginning to show to say nothing of my arthritis. We are back to bed about 12:30.

March 22 (Sunday)

This morning Dr. Kelley brings in his part of the report on Soil and water conservation that I had marked up pretty badly yesterday, but now he has it in quite good shape. Mommy types odd bits and we put the whole thing together and read it from beginning to end. About 3:00 p.m. we finish this long second draft and turn it in for mimeographing. On this short trip to the office and back I appreciate more than ever our air-conditioned room. The air temperature is about 95° to say nothing of the scorching sun. In the afternoon I start reading some of the other second-draft reports. Then dinner, back my back, and to bed.

March 23

This morning I drive out to the Embassy to get a picture of it in the morning light. Certainly it is a beautiful building, both inside and out.

Then we drive over to the business section, get some money to pay our bills, and do a few other odd chores. I order a field jacket to my own specifications and help choose a new engagement ring for my bride.

On the way back to the hotel I pick up some more reports for reading. Then lunch and notes.

The extension boys gave me the first part of their new draft. The improvement is miraculous but I hope they can cut out some more of their well-worn cliches. Mommy and I bring the Journal notes up to date.

At 7:30 p.m. Dr. and Mrs. Ralph Cummings call and take us out for dinner down town in a restaurant that serves Chinese food. After a nice dinner and pleasant talk, we are back to our hotel at 10:00 p.m.

March 24

Again I'm up too early for no good reason, except that my stomach is a bit uneasy. I read draft reports and work on the Journal notes.

After lunch we all meet in the conference room at the office for another round with the draft reports. Progress is very slow indeed.

I am back to the hotel about 6:00 and work on my notes. Then dinner, back treatment, and to bed.

March 23

This morning I drive out to the Embassy to get a picture of it in the morning light. Certainly it is a beautiful building, both inside and out.

Then we drive over to the business section, get some money to pay our bills, and do a few other odd chores. I order a field jacket to my own specifications and help choose a new engagement ring for my bride.

On the way back to the hotel I pick up some more reports for reading. Then lunch and notes.

The extension boys gave me the first part of their new draft. The improvement is miraculous but I hope they can cut out some more of their well-worn clichés. Mommy and I bring the Journal notes up to date.

At 7:30 p.m. Dr. and Mrs. Ralph Cummings call and take us out for dinner down town in a restaurant that serves Chinese food. After a nice dinner and pleasant talk, we are back to our hotel at 10:00 p.m.

March 24

Again I'm up too early for no good reason, except that my stomach is a bit uneasy. I read draft reports and work on the Journal notes. After lunch we all meet in the conference room at the office for another round with the draft reports. Progress is very slow indeed. I am back to the hotel about 6:00 and work on my notes. Then

dinner, back treatment, and to bed.

523 /TLS

23 March 1959.

Dear Dr. Ch. E. Kellogg,

As requested, we are very pleased to send you a list of some personalities you would have to see in Saigon.

President of the Republic : NGUYEN-DIEM

Vice-President and Minister

of National Economy : NGUYEN-NGOC-THO

Minister of Agriculture : LE-VAN-DONG

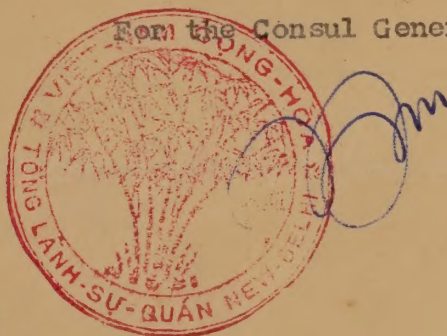
Director of Foreign Aid : VU-VAN-THAI

Director of Planning : HUYNH-VAN-DIEM

Consul-General in New Delhi: DO-VANG-LY

Yours sincerely,

For the Consul General & b.o.



Dr. Ch. E. Kellogg
Claridge's Hotel
Room 107.
New Delhi.

Public of Vietnam

THE GENERAL IN NEW DELHI

523
1712

22 March 1950

Dear Dr. Ch. S. Kellie,

As requested, we are very pleased to send

you a list of some personalities you would have to

see in Saigon.

President of the Republic : NGUYEN-THU-THU

Vice-President and Minister

of National Economy : NGUYEN-THU-THU

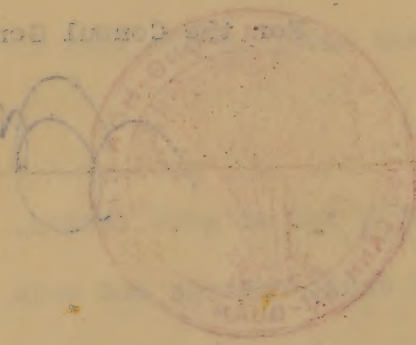
Minister of Agriculture : LA-VAN-THU

Director of Foreign Aid : VO-VAN-THU

Director of Planning : NGUYEN-VAN-THU

General-General in New Delhi : DO-VAN-THU

Yours sincerely,
General-General in New Delhi



Dr. Ch. S. Kellie
Claridge's Hotel
Room 107
New Delhi.

March 25

This morning Omer Kelley and I make a revised draft of the section for the report on Soil and water conservation. I also make a draft abstract of my section on Chemical fertilizers.

After lunch we all meet in the office again for another long and tedious session on draft reports. Except for the two mentioned above, most reports have no specific recommendations in them. Yet according to our time table "hard hitting" summaries are supposed to be finished by March 27!

The long draft of the section on Soil and water conservation I turn over to Miss Joyce, the editor. Somehow I fear that she won't understand much of it. (Added later: She didn't.)

About 5:30 I return to the hotel and revise the reports on The consolidation of fragmented holdings and A public works program for food production. These I turn over to Norman Wengert as secretary for incorporation in other sections.

This has been a rather unsatisfactory day. So many arbitrary decisions were announced, canceled, and re-announced by Dr. Ensminger, Dr. Johnson, and Miss Joyce about abstracts and outlines this afternoon that everyone is pretty well confused. I am beginning to fear seriously for the effectiveness of the report. Several on our team either will not or cannot make specific recommendations, which the able Indian administrator can understand and act upon, to say nothing of those who want to misunderstand and don't want to act. Maybe it

March 22

This morning Omer Kelley and I make a revised draft of the

section for the report on Soil and water conservation. I also

make a draft abstract of my section on Chemical fertilizers.

After lunch we all meet in the office again for another long

and tedious session on draft reports. Except for the two mentioned

above, most reports have no specific recommendations in them. Yet

according to our time table "hard hitting" summaries are supposed

to be finished by March 27!

The long draft of the section on Soil and water conservation

I turn over to Miss Joyce, the editor. Somehow I fear that she

won't understand much of it. (Added later: She didn't.)

About 5:30 I return to the hotel and revise the reports on

The consolidation of fragmented holdings and A public works program

for food production. These I turn over to Norman Wengert as secretary

for incorporation in other sections.

This has been a rather unsatisfactory day. So many arbitrary

decisions were announced, canceled, and re-announced by Dr. Ensminger,

Dr. Johnson, and Miss Joyce about abstracts and outlines this after-

noon that everyone is pretty well confused. I am beginning to fear

seriously for the effectiveness of the report. Several on our team

either will not or cannot make specific recommendations, which the

able Indian administrator can understand and act upon, to say nothing

of those who want to misunderstand and don't want to act. Maybe it

will turn out all right but tonight I feel discouraged about the prospect of a really useful report with enough solid meat in it to have either an immediate or a long-time influence on India's food production. Perhaps we are too many and too unfamiliar with both tropical agriculture and India.

At 7:30 Mommy and I go to dinner chez Mr. and Mrs. Robert Engel. The other guests are Mr. and Mrs. Heckman of TCM. We have a pleasant evening and are ready for bed at 10:45.

March 26

I am up early and work on report summaries.

At breakfast Dean Weber tells me that 60,000,000 bullocks are used for draft in India compared to a U. S. cattle population of 90,000,000 to 100,000,000. He and I agree that India needs a very large cattle population. Their present population of cattle and buffalo is too large but not nearly as much too large as most Americans assume because they forget that nearly all the field operations and deliveries of products to the local market are with bullocks. I urge Dean Weber to write a paper on this subject for American consumption. It might help to stop some of the irresponsible statements.

I then go to the office and we have further rambling discussions of the reports. It is now suggested that the final volume have three parts: (1) a brief summary, (2) a summary, and (3) the report. I object to this. It looks as if we might settle for two parts with a separate statement of highlights for discussions with the

will turn out all right but tonight I feel discouraged about the prospect of a really useful report with enough solid meat in it to have either an immediate or a long-time influence on India's food production. Perhaps we are too many and too unfamiliar with both tropical agriculture and India.

At 7:30 Mommy and I go to dinner chez Mr. and Mrs. Robert Engel. The other guests are Mr. and Mrs. Heckman of TCM. We have a pleasant evening and are ready for bed at 10:45.

March 26

I am up early and work on report summaries. At breakfast Dean Weber tells me that 60,000,000 bullocks are used for draft in India compared to a U. S. cattle population of 90,000,000 to 100,000,000. He and I agree that India needs a very large cattle population. Their present population of cattle and buffalo is too large but not nearly as much too large as most Americans assume because they forget that nearly all the field operations and deliveries of products to the local market are with bullocks. I urge Dean Weber to write a paper on this subject for American consumption. It might help to stop some of the irresponsible statements. I then go to the office and we have further rambling discussions of the reports. It is now suggested that the final volume have three parts: (1) a brief summary, (2) a summary, and (3) the report. I object to this. It looks as if we might settle for two parts with a separate statement of highlights for discussions with the

Prime Minister and other high officials. Although in the minority, I remain convinced that it would be better to have one document with one or more clear, specific, numbered recommendations in bold-face type following each subheading that gives the relevant background. Ensminger and others argue that busy administrators won't read it all. This is like saying that one won't use an encyclopedia or a Sears Roebuck catalog because he won't be able to read it all. Anybody can read the paragraphs with recommendations in a half hour or so. For any that he doesn't understand he needs to have the explanation right there.

After lunch Omer Kelley and I divide the work on the Soil and water conservation section and go ahead with the summary.

At 5:00 p.m. we have an "official" photograph on the hotel lawn.

I learn from Mr. Reza of the Planning Commission that they have figures, which they will not release, on the present arable land to be made available to the landless as a result of imposing land ceilings. Considering no exemptions for mechanized farms nor the many loopholes in the law by which a large holder may divide his land among his sons and sons-in-law, they estimate some 35,000,000 acres. I would be willing to wager that the total will not amount to as much as 5,000,000 acres, and that the quality of that will be below average.

After dinner I work on summaries until I can work no more. And so to bed.

Prime Minister and other high officials. Although in the minority, I remain convinced that it would be better to have one document with one or more clear, specific, numbered recommendations in bold-face type following each subheading that gives the relevant background. Ensminger and others argue that busy administrators won't read it all. This is like saying that one won't use an encyclopedia or a Sears Roebuck catalog because he won't be able to read it all. Anybody can read the paragraphs with recommendations in a half hour or so. For any that he doesn't understand he needs to have the explanation right there.

After lunch Omar Kelley and I divide the work on the Soil and water conservation section and go ahead with the summary. At 5:00 p.m. we have an "official" photograph on the hotel lawn. I learn from Mr. Reza of the Planning Commission that they have figures, which they will not release, on the present arable land to be made available to the landless as a result of imposing land ceilings. Considering no exemptions for mechanized farms nor the many loopholes in the law by which a large holder may divide his land among his sons and sons-in-law, they estimate some 35,000,000 acres. I would be willing to wager that the total will not amount to as much as 2,000,000 acres, and that the quality of that will be below average. After dinner I work on summaries until I can work no more. And so to bed.

Photograph of the Ford Foundation Team,
along with the local staff of the Foundation and Indian
advisors to the Team, in New Delhi, March 26, 1959.

Back row: Howard W. Beers, Harold Miles, John G. McNeely,
Gerald Kufman, E. M. Graley, Marvin Anderson, J. S. Patel,
and George M. Beal.
Front row: Jean Joyce, A. A. Johnson, Amir Kaza, S. R. Sen,
and Sherman Johnson.



Back row: Howard W. Beers, Harold Miles, John G. McNeely, Gerald Huffman, E. M. Cralley, Marvin Anderson, J. S. Patel, and George M. Beal.

Front row: Jean Joyce, A. A. Johnson, Amir Raza, S. R. Sen, and Sherman Johnson.



Back row: K. Ramiah, Omer J. Kelley, P. D. Nair,
Frank K. Naegley, T. R. Mehta, R. N. Poduval, K. P. R. Kartha,
and J. K. Basu.

Front row: J. V. A. Nehemiah, Douglas Ensminger,
Arthur D. Weber, Norman Wengert, Charles E. Kellogg,
and Ellen L. Moline.

March 27

We are up early and at the summaries. These are finished and delivered by 9:30 a.m. Since Dr. Ensminger thinks that my statement on shifting cultivations is too long (and I agree - I only put it in because I was asked to), I replace it with the original shorter statement and re-work the long one into a journal paper for separate publication if the Indians want it. Then I go back to the Journal notes.

Up to now Major Sando has not followed through with his conference of March 14 about a possible visit to Orissa. Something must have happened. Perhaps the politicians are after him again. (Added later: I heard later that he was not given the job as he expected.)

After lunch I work on the Journal notes and begin a paper for the Hawaiian Academy of Sciences.

Then dinner, back treatment, and to bed.

March 28

In the morning I write and take a short visit down town for some chores.

At 2:15 p.m. I go to the Ministry of Food and Agriculture for a conference on fertilizer goals in India. Present are Dr. Sen of the Planning Commission; Dr. Poduval, Economic Advisor in the Ministry; Dr. Sikka, Additional Agricultural Commissioner; Dr. Raychaudhuri; and others.

March 27

We are up early and at the summaries. These are finished and delivered by 9:30 a.m. Since Dr. Easwinger thinks that my statement on shifting cultivations is too long (and I agree - I only put it in because I was asked to), I replace it with the original shorter statement and re-work the long one into a journal paper for separate publication if the Indians want it. Then I go back to the Journal notes.

Up to now Major Sando has not followed through with his conference of March 14 about a possible visit to Orissa. Something must have happened. Perhaps the politicians are after him again. (Added later: I heard later that he was not given the job as he expected.) After lunch I work on the Journal notes and begin a paper for the Hawaiian Academy of Sciences. Then dinner, back treatment, and to bed.

March 28

In the morning I write and take a short visit down town for some chores. At 2:15 p.m. I go to the Ministry of Food and Agriculture for a conference on fertilizer goals in India. Present are Dr. Sen of the Planning Commission; Dr. Poduval, Economic Advisor in the Ministry; Dr. Sikka, Additional Agricultural Commissioner; Dr. Raychandhuri; and others.

These gentlemen are anxious for me to make some strong statements in my report to counteract some of the unreasonable opposition to fertilizers by highly placed officials. I take it that the Minister of Finance and several others are of the "organic" school. We discuss the quantities needed and all of these ridiculous questions about fertilizer injury to the soil, what can be done through increased composting, the relation of fertilizer use to irrigation and bunding, and so on.

The conference is over about 4:00 p.m. My driver doesn't show for some reason so Dr. Raychaudhuri brings me back to the hotel in his jeep.

I meet an interesting young couple from New Zealand - Mr. and Mrs. Cotton. He is the son of the well-known New Zealand geomorphologist.

I make a little start toward revising the fertilizer section.

At 7:15 we go to dinner with the Hixons and Gleasons. They have a large party of over 40. Dinner is very late and not especially interesting. We leave about 10:30 but the others stay on.

I have a bit of sharp talk with my driver tonight as I give him his weekly tip. I had discovered that he was pressuring merchants with whom any of us dealt to give him a commission for getting us to their places of business. (I understand this is common practice in Delhi with taxi drivers.) When I had heard this I recalled that our driver praised certain stores and ran down others. I tell him that I had heard these rumors and that if I find that he has collected any such commissions I will send forward a very bad report about him. Of course, he claims ^{to} not/have done it and not to know what I am talking about. But he understands perfectly.

These gentlemen are anxious for me to make some strong statements in my report to counteract some of the unreasonable opposition to fertilizers by highly placed officials. I take it that the Minister of Finance and several others are of the "organic" school. We discuss the quantities needed and all of these ridiculous questions about fertilizer injury to the soil, what can be done through increased composting, the relation of fertilizer use to irrigation and bunding, and so on.

The conference is over about 4:00 p.m. My driver doesn't show for some reason so Dr. Raychandhuri brings me back to the hotel in his jeep.

I meet an interesting young couple from New Zealand - Mr. and Mrs. Cotton. He is the son of the well-known New Zealand geomorphologist. I make a little start toward revising the fertilizer section.

At 7:15 we go to dinner with the Hixons and Gleasons. They have a large party of over 40. Dinner is very late and not especially interesting. We leave about 10:30 but the others stay on.

I have a bit of sharp talk with my driver tonight as I give him his weekly tip. I had discovered that he was pressuring merchants with whom any of us dealt to give him a commission for getting us to their places of business. (I understand this is common practice in Delhi with taxi drivers.) When I had heard this I recalled that our driver praised certain stores and ran down others. I tell him that I had heard these rumors and that if I find that he has collected any such commissions I will send forward a very bad report about him.

Of course, he claims not to have done it and not to know what I am talking about. But he understands perfectly.

March 29 (Sunday)

I spend the whole morning in revising the chapter on Chemical fertilizers in the light of the discussions yesterday and the file material given me.

Dr. Raychaudhuri comes for lunch with us at the hotel. Afterward we go over the draft in detail. This review leads to a few more additions, which are finally completed at 5:00 p.m. I hope this does the trick.

Then tea and Journal notes.

About 7:15 Louise Clouse comes and we join Omer Kelley in his room. After a few drinks he really gets going at high speed. And it keeps up all during a slow dinner.

I have to check out about 9:40 and get ready for bed.

March 30

This morning I get the so-called summaries. The social "science" parts are still vague. Even these summaries are mainly exhortations rather than specific suggestions.

We go to the office and have some very frank discussions that take out a lot of the fluff but not all of it. I am glad to see that Dr. Ensminger has accepted my proposed title: India's Food Crisis: And Steps to Meet It. I re-draft several of the statements for both the "highlights" and the summaries.

I am back to lunch a bit after 1:30 and begin to sort out my books and papers into four categories, (1) Embassy sea pouch, (2) Embassy air pouch, (3) Ford Foundation sea freight, and (4) in my own bags.

March 29 (Sunday)

I spend the whole morning in revising the chapter on Chemical fertilizers in the light of the discussions yesterday and the file material given me. Dr. Raychandhuri comes for lunch with me at the hotel. After-ward we go over the draft in detail. This review leads to a few more additions, which are finally completed at 5:00 p.m. I hope this does the trick.

Then tea and Journal notes.

About 7:15 Louise Clouse comes and we join Omar Kelley in his room. After a few drinks he really gets going at high speed. And it keeps up all during a slow dinner. I have to check out about 9:40 and get ready for bed.

March 30

This morning I get the so-called summaries. The social "science" parts are still vague. Even these summaries are mainly exhortations rather than specific suggestions.

We go to the office and have some very frank discussions that take out a lot of the fluff but not all of it. I am glad to see that Dr. Einsminger has accepted my proposed title: India's Food Crisis: And Steps to Meet It. I re-draft several of the statements for both the "highlights" and the summaries. I am back to lunch a bit after 1:30 and begin to sort out my

books and papers into four categories, (1) Embassy sea pouch, (2) Embassy air pouch, (3) Ford Foundation sea freight, and (4) in my

own bags.

About 4:00 p.m. we are in the Ministry of Food and Agriculture for a conference with Minister Jain, Secretary of Agriculture Damle, and others of the Ministry staff.

Sherman Johnson takes the lead and reads the highlight statements. Minister Jain is a bit hesitant to accept the target of 110 million tons of food grains for the end of the Third Plan. Apparently Dr. Sen has not informed us precisely about the base used by the Minister in his statements to Parliament. This is too bad because the trend lines could have been calculated from the other base also without much effect on the estimated gap of 28,000,000 tons at the present rate of increase.

Minister Jain also asks whether or not we gave any attention to plant protection and how the work should be organized including legislation. He asks about agricultural machinery and I explain that our real report goes into several of these important items in detail.

Apparently the Minister thinks that these few brief "highlights" that Johnson read to him make up our report. He thanks us curtly and the meeting is over with very little discussion.

This is precisely what I had feared might happen. We should have had our full report with its specific recommendations numbered and underscored in the text so that he would understand that we did have specific suggestions based upon facts and analysis. I had argued for this to no avail. Such men read and think rapidly and are not the children some Americans assume them to be. Nor should they be read to. Last year I had good attention and lively debate. But this session was a complete frost. I even wonder if he will read our report.

About 4:00 p.m. we are in the Ministry of Food and Agriculture for a conference with Minister Jain, Secretary of Agriculture Damsie, and others of the Ministry staff. Sherman Johnson takes the lead and reads the highlight statements. Minister Jain is a bit hesitant to accept the target of 110 million tons of food grains for the end of the Third Plan. Apparently Dr. Sen has not informed us precisely about the base used by the Minister in his statements to Parliament. This is too bad because the trend lines could have been calculated from the other base also without much effect on the estimated gap of 28,000,000 tons at the present rate of increase. Minister Jain also asks whether or not we gave any attention to plant protection and how the work should be organized including legislation. He asks about agricultural machinery and I explain that our real report goes into several of these important items in detail. Apparently the Minister thinks that these few brief "highlights" that Johnson read to him make up our report. He thanks us curtly and the meeting is over with very little discussion. This is precisely what I had feared might happen. We should have had our full report with its specific recommendations numbered and underscored in the text so that he would understand that we did have specific suggestions based upon facts and analysis. I had argued for this to no avail. Such men read and think rapidly and are not the children some Americans assume them to be. Nor should they be read to. Last year I had good attention and lively debate. But this session was a complete frost. I even wonder if he will read our report.

We return to the hotel and both before and after dinner I rework parts of the section on Chemical fertilizers.

Then a back treatment and to bed.

March 31

After breakfast we go for another meeting on draft reports. The discussions of research and of experimental programs to concentrate technical assistance and education in a few representative villages just goes around in circles. The drafts will need to be redone completely.

We then discuss our plans for a conference with the Prime Minister and Dr. Ensminger suggests that we split up the discussion at the meeting.

I return to the hotel for a late lunch and afterward prepare a statement on the needs for technical assistance and other short statements requested by Dr. Ensminger.

About 5:00 p.m. we have another conference at the office and shape a revised agenda for our meetings with the Prime Minister and in the Ministry of Community Development. I certainly hope these work out better than the meeting yesterday.

At 7:15 we leave for dinner chez Leagens. Again dinner is very late and we are back to the hotel at 10:40.

We return to the hotel and both before and after dinner I rework parts of the section on Chemical fertilizers.

Then a back treatment and to bed.

March 31

After breakfast we go for another meeting on draft reports.

The discussions of research and of experimental programs to concen-

trate technical assistance and education in a few representative

villages just goes around in circles. The drafts will need to be

redone completely.

We then discuss our plans for a conference with the Prime Minister

and Dr. Ensminger suggests that we split up the discussion at the

meeting.

I return to the hotel for a late lunch and afterward prepare a

statement on the needs for technical assistance and other short state-

ments requested by Dr. Ensminger.

About 5:00 p.m. we have another conference at the office and shape

a revised agenda for our meetings with the Prime Minister and in the

Ministry of Community Development. I certainly hope these work out

better than the meeting yesterday.

At 7:15 we leave for dinner chez Legens. Again dinner is very

late and we are back to the hotel at 10:40.

April 1

I work this morning on some more revisions including a sticky acknowledgment suggested by Beers. I take these to the office for typing and then we all go to a conference in the Ministry of Community Development on some of the highlights of our draft report that affect this Ministry.

Since Minister Dey is ill, the Deputy and several other staff members sit with us as follows:

Mr. B. S. Murthy, Deputy Minister, Ministry of Community Development

Mr. S. D. Misra, Parliamentary Secretary, Ministry of Community Development

Mr. B. R. Tandan, Secretary, Ministry of Community Development

Mr. B. Mukerji, Joint Secretary, Ministry of Community Development

Mr. A. S. Naik, Joint Secretary, Ministry of Community Development

Mr. Abid Hussain, Deputy Secretary (Administration), Ministry of Community Development

Dr. J. S. Patel, Adviser (Agriculture), Ministry of Community Development

Mr. Ibne Ali, Deputy Adviser (A), Ministry of Community Development

Mr. J. P. Mital, Adviser (Irrigation), Ministry of Community Development

Mr. Athar Hussain, Under Secretary, Ministry of Community Development

Dr. P. M. N. Naidu, Adviser (Animal Husbandry), Ministry of Community Development

Dr. H. D. R. Iyyengar, Deputy Director, Fisheries, Ministry of Community Development

Mr. M. R. Bhide, Additional Secretary, Department of Cooperation, Ministry of Community Development

I work this morning on some more revisions including a sticky acknowledgment suggested by Beers. I take these to the office for

typing and then we all go to a conference in the Ministry of Community Development on some of the highlights of our draft report that affect this Ministry.

Since Minister Dey is ill, the Deputy and several other staff

members sit with us as follows:

Mr. B. S. Murthy, Deputy Minister, Ministry of Community Development

Mr. S. D. Misra, Parliamentary Secretary, Ministry of Community Development

Mr. B. R. Tandan, Secretary, Ministry of Community Development

Mr. B. Mukerji, Joint Secretary, Ministry of Community Development

Mr. A. S. Naik, Joint Secretary, Ministry of Community Development

Mr. Abid Hussain, Deputy Secretary (Administration), Ministry of Community Development

Dr. J. S. Patel, Adviser (Agriculture), Ministry of Community Development

Mr. Iqbal Ali, Deputy Adviser (A), Ministry of Community Development

Mr. J. P. Mehta, Adviser (Irrigation), Ministry of Community Development

Mr. Achar Hussain, Under Secretary, Ministry of Community Development

Dr. P. M. N. Naidu, Adviser (Animal Husbandry), Ministry of Community Development

Dr. H. D. R. Iyengar, Deputy Director, Fisheries, Ministry of Community Development

Mr. M. R. Bhide, Additional Secretary, Department of Cooperation, Ministry of Community Development

Sherman Johnson goes ahead with a general statement following roughly the outline prepared for discussion with the Prime Minister. It is a bit vague but so is this Ministry.

This conference seems to work out a little bit better than the one with Minister Jain. Unhappily, three of the team read their points and our Indian associates get a bit confused trying to follow the longer printed material that had been handed them. Much of it did not get through but I think that about five main points did.

(1) There is an impending food shortage of serious magnitude.

(2) Opportunities should be taken for setting village targets in cooperation with the villagers themselves.

(3) The new practices apply unequally in different soil areas.

(4) The great importance of schemes to use the existing potentially productive soil now lying idle all over India.

(5) That other goals of Community Development which supplement the food goals, such as health and education, should go forward with the food program but that the construction items that do not contribute should be postponed.

Just as we leave, the Deputy Minister gives us quite a speech on the need for bringing social justice to all in a way that suggests something different from an emphasis on food.

After lunch I assemble most of my books and papers for sending home.

I leave the hotel about 3:15 for the Ministry of Food and Agriculture and meet Dr. Basu and other directors of the Soil Conservation Board in the office of Dr. Uppal.

Sherman Johnson goes ahead with a general statement following roughly the outline prepared for discussion with the Prime Minister. It is a bit vague but so is this Ministry. This conference seems to work out a little bit better than the one with Minister Jain. Unhappily, three of the team read their points and our Indian associates get a bit confused trying to follow the longer printed material that had been handed them. Much of it did not get through but I think that about five main points did.

- (1) There is an impending food shortage of serious magnitude.
- (2) Opportunities should be taken for setting village targets in

cooperation with the villagers themselves.

- (3) The new practices apply unequally in different soil areas.

- (4) The great importance of schemes to use the existing potential

of productive soil now lying idle all over India.

- (5) That other goals of Community Development which supplement

the food goals, such as health and education, should go forward with

the food program but that the construction items that do not contribute

should be postponed.

Just as we leave, the Deputy Minister gives us quite a speech on

the need for bringing social justice to all in a way that suggests

something different from an emphasis on food.

After lunch I assemble most of my books and papers for sending home.

I leave the hotel about 3:15 for the Ministry of Food and Agriculture

and meet Dr. Basu and other directors of the Soil Conservation Board

in the office of Dr. Upad.

We have a general discussion that includes most of the main points in those sections of the report with which I have been concerned. Dr. Uppal is very cordial and I don't get away until about 5:30.

When I get back to the hotel Dr. Wengert tells me that they cannot find some of my reports so we rush over to the office in a cab to see Miss Joyce. What a mess she has! Various drafts of reports and summaries lie about helter skelter without system or care. I look through the whole mess and find the missing ones mixed in with other papers. I don't quite know how she is going to straighten this stuff out.

I return to the hotel for dinner and make a few slight revisions in reports. After dinner a back treatment and to bed.

April 2

I awaken very early again and sleep only a bit after 4:30. I work for a while on Journal notes and go to a conference in the office at 9:00 a.m.

We discuss some more late drafts and then strategies for meetings with the Minister of Finance this afternoon and the Prime Minister this evening. At my suggestion it was agreed that speakers would avoid reading their notes. (Added later: But some could not do it.) I may have a little rough time discussing fertilizers because the Minister of Finance doesn't believe in them fully. I ask one of our Indian associates to get me the figures on fertilizer use this year

We have a general discussion that includes most of the main points in those sections of the report with which I have been concerned. Dr. Upfal is very cordial and I don't get away until about

2:30.

When I get back to the hotel Dr. Wengert tells me that they cannot find some of my reports so we rush over to the office in a cab to see Miss Joyce. What a mess she has! Various drafts of reports and summaries lie about helter skelter without system or care. I look through the whole mess and find the missing ones mixed in with other papers. I don't quite know how she is going to straighten this stuff out.

I return to the hotel for dinner and make a few slight revisions in reports. After dinner a back treatment and to bed.

April 2

I awaken very early again and sleep only a bit after 4:30. I work for a while on Journal notes and go to a conference in the office at 9:00 a.m.

We discuss some more late drafts and then strategies for meetings with the Minister of Finance this afternoon and the Prime Minister this evening. At my suggestion it was agreed that speakers would avoid reading their notes. (Added later: But some could not do it.) I may have a little rough time discussing fertilizers because the Minister of Finance doesn't believe in them fully. I ask one of our Indian associates to get me the figures on fertilizer use this year

so that I may have them to compare with the Third Plan goals. When these come I revise that part of the "highlight" statement and return to the hotel for lunch. Just before leaving the office I discuss with Sherman Johnson again his estimate of a shortage of 28,000,000 tons of food grain in 1965-66 at the present rate of agricultural increase. I explain that I am afraid that the Indian statistics are not sufficiently reliable for us to be dogmatic about this particular figure. Nor does it matter too much whether the necessary food increases are all grains.

After lunch we finish packing the things for Mommy to take to the Embassy and work a bit on Journal notes.

At 3:15 we leave for a meeting in the office of the Minister of Finance, Mr. Morarji Desai, formerly of Bombay State. (Last year he was Minister of Commerce and Industry when I talked with him.)

Sherman Johnson presents our conclusions about the long-time food needs and our proposals for the stabilization of agricultural prices. I present our recommendations for a rural public works program to give jobs to the unemployed on works that would give immediate increases in food production and use. Both of us have several interruptions but these are friendly.

The Minister explains the many pitfalls of price-support programs in India. Then too, the opposition politicians demand lower prices for workers and higher prices to cultivators. He points out that he needs the votes of both groups. Then he goes on to discuss the great difficulties he has in finding the money to establish industries. He

so that I may have them to compare with the Third Plan goals.

When these come I revise that part of the "highlight" statement and return to the hotel for lunch. Just before leaving the office I discuss with Sherman Johnson again his estimate of a shortage of 28,000,000 tons of food grain in 1965-66 at the present rate of agricultural increase. I explain that I am afraid that the Indian statistics are not sufficiently reliable for us to be dogmatic about this particular figure. Nor does it matter too much whether the necessary food increases are all grains.

After lunch we finish packing the things for Mommy to take to

the Embassy and work a bit on Journal notes.

At 3:15 we leave for a meeting in the office of the Minister of Finance, Mr. Morarji Deasai, formerly of Bombay State. (Last year he was Minister of Commerce and Industry when I talked with him.)

Sherman Johnson presents our conclusions about the long-time food needs and our proposals for the stabilization of agricultural prices. I present our recommendations for a rural public works program to give jobs to the unemployed on works that would give immediate increases in food production and use. Both of us have several interruptions but these are friendly.

The Minister explains the many pitfalls of price-support programs in India. Then too, the opposition politicians demand lower prices for workers and higher prices to cultivators. He points out that he needs the votes of both groups. Then he goes on to discuss the great difficulties he has in finding the money to establish industries. He

says, "Even our ladies want to copy your styles and I need their votes too." He is saying that it is not possible to deny all luxury production.

He gives us quite a lecture on Indian culture. He says that the Indian peasant is poor, but is as well cultured in the real sense as any peasant.

He says: "We might build up our industry by the methods employed in the Soviet Union; but I should rather remain poor." But he goes on to point out that India is sticking to the democratic process and might lose to the Communists through that process. (Here I think he intends a little dig: The United States outlawed Communists and India hasn't.)

Some of his statements about industry subsidizing agriculture in the United States are way off. (He apparently talked to some city conservatives during his recent visit.) But we let that pass.

He is really saying, I think, that he agrees that most of our recommendations should be carried out but that it will be exceedingly difficult to find the funds. Of course, he makes no commitments; no good Minister of Finance ever does in advance.

He gives us many examples of the complex economic and political problems he must weigh in budgeting internal funds and foreign exchange.

As the meeting closes I wonder who has learned more, the Minister or our team. Certainly he controlled the conference.

says, "Even our ladies want to copy your styles and I need their

votes too." He is saying that it is not possible to deny all

luxury production.

He gives us quite a lecture on Indian culture. He says that

the Indian peasant is poor, but is as well cultured in the real sense

as any peasant.

He says: "We might build up our industry by the methods employed

in the Soviet Union; but I should rather remain poor." But he goes

on to point out that India is sticking to the democratic process and

might lose to the Communists through that process. (Here I think he

intends a little dig: The United States outlawed Communists and

India hasn't.)

Some of his statements about industry subsidizing agriculture in

the United States are way off. (He apparently talked to some city

conservatives during his recent visit.) But we let that pass.

He is really saying, I think, that he agrees that most of our

recommendations should be carried out but that it will be exceedingly

difficult to find the funds. Of course, he makes no commitments; no

Good Minister of Finance ever does in advance.

He gives us many examples of the complex economic and political

problems he must weigh in budgeting internal funds and foreign exchange.

As the meeting closes I wonder who has learned more, the Minister

or our team. Certainly he controlled the conference.

After the meeting most of my associates seem discouraged but I am not. I think the Minister will give as much consideration to our recommendations as he can. Judging by the results of my last year's report, I think they will get much more consideration with a conference than without one.

I am back to the hotel at 4:45.

At 6:45 we go to the residence of the Prime Minister. At first we are taken out into the garden but it starts to get dark so we are taken into a reception room. Prime Minister Nehru comes in about 7:30. We then present the highlight items that would involve cabinet action. I present the public works discussion and also some statements about chemical fertilizers; other members of the team present other points. Although Mr. Nehru is very tired, he listens attentively and makes a few comments and asks a few questions. As we leave he is very cordial and sees us to our cars.

I think the meeting went quite well; at least the Prime Minister showed no irritation at any of our suggestions.

We are back to the hotel about 8:30. I am very tired indeed tonight. We have dinner and then are early to bed.

After the meeting most of my associates seem discouraged but I am not. I think the Minister will give as much considera-

tion to our recommendations as he can. Judging by the results of my last year's report, I think they will get much more consideration with a conference than without one.

I am back to the hotel at 4:45.

At 6:45 we go to the residence of the Prime Minister. At first

we are taken out into the garden but it starts to get dark so we are

taken into a reception room. Prime Minister Nehru comes in about

7:30. We then present the highlight items that would involve cabinet

action. I present the public works discussion and also some statements

about chemical fertilizers; other members of the team present other points.

Although Mr. Nehru is very tired, he listens attentively and makes a

few comments and asks a few questions. As we leave he is very cordial

and sees us to our cars.

I think the meeting went quite well; at least the Prime Minister

showed no irritation at any of our suggestions.

We are back to the hotel about 8:30. I am very tired indeed

tonight. We have dinner and then are early to bed.

INDIA'S FOOD CRISIS

Steps to Meet it

I. THE GAP IN FOOD PRODUCTION

— India is making steady progress in increasing food production, but the rate of increase must be tripled.

— If India's food production increases no faster than present rates, the gap between supplies and target will be 28 million tons by 1965-66. This will be about 25 percent shortfall in terms of need.

— No conceivable program of imports or rationing can meet a crisis of this magnitude.

— There will probably be 80 million more people in India, or a total population of about 480 millions, by the end of the Third Plan. India must have food enough for the added millions, also enough to provide for some dietary improvement, and a safety margin for poor crop years.

— A Third Plan target of 110 million tons of food grains, therefore, is reasonable in terms of need.

— A Third Plan target of 110 million tons can be achieved. The best in Indian agriculture is comparable to the best in other countries. The task is to develop ways of raising the low average to the highest levels which some Indian cultivators have achieved.

— But 110 million ton target cannot be realized unless an all-out emergency food production program is undertaken. Food production must be given the highest priority for personnel, fertilizers, steel, and all other necessary resources.

— The crisis in food production requires action at the highest levels of government. Decisions must be made which are binding on all Ministries of Government and all levels of Government, and which are supported by political leaders.

— The crucial role of food production must be recognized by all Ministries and agencies concerned with any program affecting food production, directly or indirectly. The problem of food enough is India's primary problem of human welfare, social justice and democracy.

II. THE CRUCIAL ISSUES

1. STABILIZATION OF FARM PRICES:

Unless the cultivator is assured of a floor price for his food grains, he will be unwilling to invest in fertilizer, better implements, improved seed and other expenses necessary to increase production. Price incentives for increased production must provide for:

- (a) A guaranteed minimum price announced in advance of the planting season.

CONFIDENTIAL

TO: [illegible]
FROM: [illegible]

SUBJECT: [illegible]

1. [illegible]

2. [illegible]

3. [illegible]

4. [illegible]

5. [illegible]

6. [illegible]

7. [illegible]

8. [illegible]

9. [illegible]

10. [illegible]

- (b) A market within bullock-cart distance that will pay the guaranteed price when the cultivator has to sell.
- (c) Suitable local storage. Immediate consideration should be given to using funds available from grain imports under PL 480 and other special programs to construct needed godowns in village areas.

2. A PUBLIC WORKS PROGRAM FOR INCREASING FOOD PRODUCTION AND VILLAGE EMPLOYMENT.

The unemployed and underemployed in the villages represent a waste of resources that should be used to produce more food. Moreover, about 45 million of the 80 million increase in population will be rural people. A public works program should be developed for projects requiring primarily hand labor, such as contour bunding, land levelling, surface drainage, irrigation wells and tanks - all of which will contribute directly to increasing food production, provide income for needy people, and will not be inflationary.

3. MORE CHEMICAL FERTILIZERS

Efforts toward fuller use of manures, composts, and green manures are commended. But at the very best they can substitute for only a small fraction of the chemical fertilizers needed to meet Third Plan food targets. Only with more abundant chemical fertilizers will benefits from irrigation, bunding, improved seeds, and other facilities be realised.

The targets for the end of the Third Plan, developed in the Ministry of Food and Agriculture, are soundly based but conservative in relation to need. These amount to 1,500,000 tons of nitrogen, 750,000 tons of phosphoric acid, and 200,000 tons of potash. Even though conservative, they mean a 9-fold increase in nitrogen and considerably larger increases of the others, the use of which has just started.

Hence, the procurement of fertilizers, and of the means of producing high-analysis fertilizers, must be given a top priority, including foreign exchange as necessary.

4. IRRIGATION AND DRAINAGE

India is using only a small portion of its potential water supply, which is one of the largest in the world. More emphasis should be placed on irrigation projects which will yield rapid returns in food production, such as tube wells and shallow masonry wells.

India now gets only one-fifth to one-fourth ton increase in crop yields on irrigated lands as compared to non-irrigated lands. Moreover, only about 12% of irrigated acreage grows more than one irrigated crop per year. India cannot afford this waste of resources. Better water

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1861.

2. The second part is a report from the Secretary of the Treasury, dated January 1, 1861.

3. The third part is a report from the Secretary of the Interior, dated January 1, 1861.

4. The fourth part is a report from the Secretary of the Navy, dated January 1, 1861.

5. The fifth part is a report from the Secretary of the War, dated January 1, 1861.

6. The sixth part is a report from the Secretary of the State, dated January 1, 1861.

7. The seventh part is a report from the Secretary of the Agriculture, dated January 1, 1861.

8. The eighth part is a report from the Secretary of the Education, dated January 1, 1861.

9. The ninth part is a report from the Secretary of the Public Works, dated January 1, 1861.

10. The tenth part is a report from the Secretary of the Finance, dated January 1, 1861.

management is needed. In fact, India can make greater and more immediate gains in food production by intensifying expenditure of time and effort on water management than by constructing large scale irrigation projects which take years to develop. The Third Plan should allocate substantial funds for technical assistance to aid cultivators in making better use of available water. Provision must also be made for a more comprehensive approach, with coordination of all relevant departments.

Millions of acres could be reclaimed and made more productive by drainage improvement. Improvement should be given a high priority. A unified agency is necessary in each State for coordination and improvement of drainage.

5. SELECTION OF CERTAIN CROPS AND CERTAIN AREAS FOR MORE INTENSIVE EFFORTS:

There is no panacea. There are no blanket proposals that can be generally applied to reach the goal. Selected crops, and selected areas in each State should be chosen which have the greatest increase potentialities.

Selected Crops: Efforts to stimulate food production should be directed more heavily to rice and wheat, which now make up 62% of total food crops. With hybrid maize, India can in 5 to 7 years make more progress in increasing yields than the U.S.A. made in 20 years.

Selected Areas: More effort should be concentrated on the most promising areas for wheat and rice production, i.e. those which have had the most rapid rate of increase in the recent past, and which have also the highest potential for rapid large increase in the years immediately ahead. For rice, there are 25 important growing districts; for wheat, there are selected districts in the Punjab, U.P., M.P., and Bihar.

These areas will, we believe, increase India's food production more rapidly than others, if given allocation of fertilizers in combination with other improved practices, such as plant protection measures, improved seeds and water for irrigation.

Attention to other areas should not be reduced. But, in the national interest, increased effort must, we believe, be immediately directed to the most responsive areas.

6. SECURITY OF LAND TENURE AND LAND CONSOLIDATION.

Assurance of stability of tenure can contribute substantially to food production. Land ceilings and other land reforms should be settled as quickly as possible, and stay settled for the Third Plan. Firm plans should be developed immediately to schedule the completion of consolidation of fragmented holdings, village by village, as soon as possible. Improved coordination must be provided. In some Indian villages consolidation has been carried out in ways to increase production greatly; in others it has not, because of inadequate coordination with those responsible for planning water control structures and boundaries of holdings.

7. IMMEDIATE LARGE SCALE CREDIT THROUGH COOPERATIVES.

The present marketing, supply and credit services are major deterrents to increasing food production. 85 percent of credit is now supplied by money lenders and other individuals. Most marketable grains are sold to local traders at harvest time at depressed prices. Strong cooperatives can break these bonds. To help them do so effectively:

- Government must be prepared to provide adequate capital and assist in developing capable management.
- Standards of credit-worthiness must be redefined to encourage production loans on the basis of expected crop yields and repayment ability, instead of land security.

8. PROGRESSIVE REDUCTION OF CATTLE NUMBERS.

The excessive animal population competes with people for the products of the land. We recognize the limitations imposed by beliefs concerning cattle slaughter. Other ways of dealing with the problem are possible. Legislation should be considered providing for:

- A tax policy which makes maintenance of useless cattle a burden on their owners. Tax receipts could go to villages for improvements.
- Compulsory confinement of all bulls, and mandatory castration of all bulls not kept for breeding.
- Measures to control open grazing.
- Establishment of dessicating plants to process fallen animals, with incentive payments to owners who bring in fallen cattle.

9. THE URGENCY OF A HIGH-LEVEL COORDINATING FOOD PRODUCTION AUTHORITY.

Far reaching centralized authority with a clear line of command and execution alone can meet the challenge of growing more food. Such authority is essential:

- to allocate resources on a priority basis - such as personnel, fertilizers, steel (for sprayers, godowns, fertilizer plants, etc.);
- to coordinate irrigation, drainage and soil management programs;
- and to enforce policy decisions giving priority to food production.

The administrative structure must be simplified and clear lines of authority and responsibility established at all levels of government, so that policy decisions are carried out to the village level.

10. THE ROLE OF COMMUNITY DEVELOPMENT AND THE TECHNICAL MINISTRIES.

All Ministries concerned with any aspect or program relevant to food production must give top priority to food production now and for the period of the Third Plan. Community Development and all technical agencies must be geared to mobilization and strengthening of village leaders and organizations, and effective channelling to village people of all information and help necessary to increase food yields.

To the extent that India succeeds in providing food enough for her massive population, the nation will have accomplished the first and basic step in achieving social justice.

1900

CHAS. W. F. ...
...
...
...
...

...
...
...

April 3

This morning we start our preliminary sorting and packing for leaving India next Tuesday. Yesterday Mommy took a bundle of papers out to the Embassy to be sent to my office and this morning I take another large bundle to the office of the Ford Foundation to be sent home.

After lunch I go to our office to discuss the final drafts of my sections of the report with the editor. She is even more badly informed than I had feared and had a great many ridiculous suggestions for change. She raised questions about "lucerne", "consumptive use", "intensive soil use", and many other common agricultural expressions. I am afraid that she is bound to make a mess of the technical parts, not because she doesn't know but because she doesn't realize that she doesn't know. Apparently she has had no scientific or technical education. I am unable to finish but she promises to have a clean copy next Tuesday.

At 3:45 I go with others for a brief conference with U. S. Ambassador Bunker and his top staff. With him we go over the same general outline that we presented to the Prime Minister. We have a good discussion with him and leave about 5:00.

At 5:30 we go to a tea in the President's house given by Minister Jain for the team, our Indian associates, and a few others. All of our Indian hosts are cordial and friendly. I have a nice talk with

April 3

This morning we start our preliminary sorting and packing for leaving India next Tuesday. Yesterday Mommy took a bundle of papers out to the Embassy to be sent to my office and this morning I take another large bundle to the office of the Ford Foundation to be sent home.

After lunch I go to our office to discuss the final drafts of my sections of the report with the editor. She is even more badly informed than I had feared and had a great many ridiculous suggestions for change. She raised questions about "lucerne", "consumptive use", "intensive soil use", and many other common agricultural expressions. I am afraid that she is bound to make a mess of the technical parts, not because she doesn't know but because she doesn't realize that she doesn't know. Apparently she has had no scientific or technical education. I am unable to finish but she promises to have a clean copy next Tuesday.

At 3:45 I go with others for a brief conference with U. S. Ambassador Bunker and his top staff. With him we go over the same general outline that we presented to the Prime Minister. We have a good discussion with him and leave about 5:00.

At 5:30 we go to a tea in the President's house given by Minister Jain for the team, our Indian associates, and a few others. All of our Indian hosts are cordial and friendly. I have a nice talk with

the Minister about the problem of irrigation on farms, the big drainage problem in the Ganges Plain, the opportunities for contour bunding, and the important problem of controlled grazing.

We drive back to the hotel for a little while and then go to the Ensmingers for dinner with a very large group of Indians and Americans. Again dinner comes very late. Mommy has a nice evening with her Indian associates but mine are not very articulate.

At 10:30 we take our leave and are soon back to the hotel for bed.

April 4

We are up early for a trip to Kashmir. After breakfast we are told that the plane is ready to go so we leave the hotel a little after 8:00. We have a leisurely check-in at the airport and get into the chartered plane. We are in the air at 8:52. It is warm, sunny, and very hazy.

As we fly north of Delhi, the problems I have been stressing are abundantly obvious: (1) Large areas of soil ruined by digging for brick clay, (2) potentially good soil lying unused for institutional reasons, (3) waterlogging and salt, and (4) the blocking of the natural drainage by highways and canals. Now, most of the soil seems dry except for a few ponds and wettish areas with blocked drainage. A high percentage of the villages are nearly surrounded with derelict land resulting from soil removal over many centuries. Now the soil is wet and salty.

the Minister about the problem of irrigation on farms, the big drainage problem in the Ganges plain, the opportunities for contour bunding, and the important problem of controlled grazing. We drive back to the hotel for a little while and then go to the Messengers for dinner with a very large group of Indians and Americans. Again dinner comes very late. Mommy has a nice evening with her Indian associates but mine are not very articulate. At 10:30 we take our leave and are soon back to the hotel for bed.

April 4

We are up early for a trip to Kashmir. After breakfast we are told that the plane is ready to go so we leave the hotel a little after 8:00. We have a leisurely check-in at the airport and get into the chartered plane. We are in the air at 8:52. It is warm, sunny, and very hazy.

As we fly north of Delhi, the problems I have been stressing are abundantly obvious: (1) Large areas of soil ruined by digging for brick clay, (2) potentially good soil lying unused for irrational reasons, (3) waterlogging and salt, and (4) the blocking of the natural drainage by highways and canals. Now, most of the soil seems dry except for a few ponds and wetland areas with blocked drainage. A high percentage of the villages are nearly surrounded with derelict land resulting from soil removal over many centuries. Now the soil is wet and salty.

Permit No.. F. 163 /KPS/D (Permits) New Delhi 13-3-1958

1. This permit is valid :—

(i) For a visit to Kashmir from any place in India outside the State, within 30 days from the date of its issue ; and

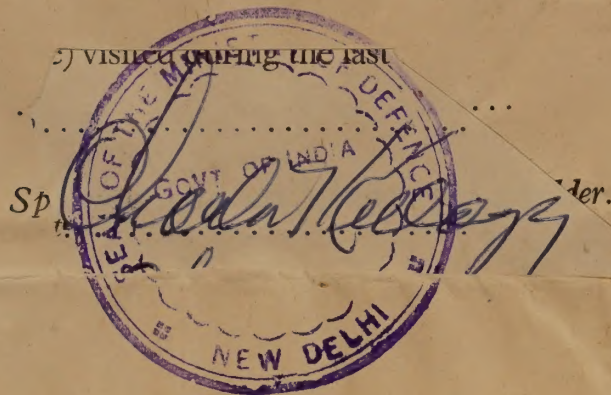
(ii) for stay in Kashmir for a period of (15) Fifteen days from the date of entry into Kashmir.

2. Notwithstanding anything stated above, this permit ceases to have any validity in the case of non-Indians on the expiry of Passport, Visa, or the Police registration.

Name in full Mr./Mrs./Miss... Dr. CHARLES E. KELLOGG

Father's/Husband's name... Mr. HERBERT F. KELLOGG

Age... 56 years Occupation... Consultant Fed Foundation



[Handwritten signature]

Signature of the Issuing Authority.

Name (T. S. SAWHNEY)

Designation Under Secretary,
Ministry of Defence.

[Handwritten signature]

Extension granted from..... to

Signature of the extending Authority,

Place.....

Name

Date

Designation.....

NOTE:—1. In case it is desired that the period of validity of this permit should be extended, application to that effect should be addressed to the Inspector General of Police, Jammu and Kashmir State.

2. The Inspector General of Police or any officer authorised by him in this behalf may allow a permit holder to stay on in the State for a period not exceeding 30 days beyond the period of validity of this permit.



I have a talk with Dr. Ensminger on the plane about a proposal for Ford to bring in around 15 topnotch agricultural experts. I think this is a good idea provided each individual is highly competent technically, has unusually good work habits, and has had successful experience working with large groups and with high-level administrators. I should rather see this done by the U. S. Government but I'm convinced that ICA simply cannot or will not do it. I suggest that consideration should not be limited to Americans nor to people in the Department or in the colleges. He tells me that one Indian asked him, "What sort of people made America great?" Obviously he knew they were not like the average sent by ICA.

About 9:47 we pass Bhatinda. The soil is nearly level and a few spots show some soil drifting into very low dunes. About 50 miles north of Bhatinda I see an excellent example of a large irrigation canal built in regular lines across the country, without culverts, that blocks all the natural drainage and causes unnecessary waterlogging. Back of it a large low drainageway has become very salty. With proper bridges for highways, railways, and canals nearly all of this could be prevented.

About 75 miles north of Bhatinda we cross a group of streams and old braided channels that go to form the Sutlej, which flows southwest into Pakistan. Immediately beyond, the agriculture looks better with much less derelict soil. But here too, there has been waterlogging of the natural drainageways, especially where the irrigation canals have been built within them or across them.

I have a talk with Dr. Bisminger on the plans about a proposal

for Ford to bring in around 15 top-notch agricultural experts. I

think this is a good idea provided each individual is highly

competent technically, has unusually good work habits, and has had

successful experience working with large groups and with high-level

administrators. I should rather see this done by the U. S. Govern-

ment but I'm convinced that ICA simply cannot or will not do it.

I suggest that consideration should not be limited to Americans nor

to people in the Department or in the colleges. He tells me that

one Indian asked him, "What sort of people made America great?"

Obviously he knew they were not like the average sent by ICA.

About 9:47 we pass Bhatinda. The soil is nearly level and a

few spots show some soil drifting into very low dunes. About 50 miles

north of Bhatinda I see an excellent example of a large irrigation

canal built in regular lines across the country, without culverts,

that blocks all the natural drainage and causes unnecessary water-

logging. Back of it a large low drainage way has become very salty.

With proper bridges for highways, railways, and canals nearly all

of this could be prevented.

About 75 miles north of Bhatinda we cross a group of streams

and old braided channels that go to form the Sutlej, which flows

southwest into Pakistan. Immediately beyond, the agriculture looks

better with much less derelict soil. But here too, there has been

waterlogging of the natural drainageways, especially where the irri-

gation canals have been built within them or across them.

We fly over Amritsar at 10:26. Just south of it are very bad spots of waterlogging and salt. To the north some 5 to 10 percent of the soil is worthless from waterlogging and salt, which suggests that at least one-half of the rest of it will soon be ruined unless drainage is provided. We continue mainly north and fly over a small bulge of Pakistan that extends east into India. Where we cross the border waterlogging is still very bad. As we go on I see many curving braided stream courses coming out of the mountain foothills to the east. Then we come to Jammu and Kashmir. The land is becoming increasingly dissected by dry stream courses with sandy beds. At 80 miles north of Amritsar, the land is mostly waste. The tilted rocks dip to the southwest and are strongly dissected. I see small paddy areas here and there, in the valleys and on the easy slopes. The mountains have scattered trees and shrubs. Then we cross a major winding stream with dissected terraces at several levels. These are terraced and leveled, mainly for paddy I presume. Many fields are being prepared for some kind of crop. Then we cross low mountains where the rocks dip strongly to the northeast. We fly over a broad, old, irregular stream valley with dissected terraces at many levels. All available good soil is banded (or terraced) for crops. To the north and east I see the snow-capped Himalayas. Then we pass over low mountains with many terraced areas on the slopes where the soil is deep enough. Some of these have rather high vertical faces and yet are narrow. The steep slopes have forest, which is much better on the north-facing slopes than on the south-

We fly over Amritsar at 10:26. Just south of it are very bad spots of waterlogging and salt. To the north some 5 to 10 percent of the soil is worthless from waterlogging and salt, which suggests that at least one-half of the rest of it will soon be ruined unless drainage is provided. We continue mainly north and fly over a small bulge of Pakistan that extends east into India. Where we cross the border waterlogging is still very bad. As we go on I see many curving braided stream courses coming out of the mountain foothills to the east. Then we come to Jammu and Kashmir. The land is becoming increasingly dissected by dry stream courses with sandy beds. At 80 miles north of Amritsar, the land is mostly waste. The tilted rocks dip to the southwest and are strongly dissected. I see small paddy areas here and there, in the valleys and on the easy slopes. The mountains have scattered trees and shrubs. Then we cross a major winding stream with dissected terraces at several levels. These are terraced and leveled, mainly for paddy I presume.

Then we cross low mountains where the rocks dip strongly to the northeast. We fly over a broad, old, irregular stream valley with dissected terraces at many levels. All available good soil is banded (or terraced) for crops. To the north and east I see the snow-capped Himalayas. Then we pass over low mountains with many terraced areas on the slopes where the soil is deep enough. Some of these have rather high vertical faces and yet are narrow. The steep slopes have forest, which is much better on the north-facing slopes than on the south-

facing ones. Soil is terraced for crops on some of the hilltops where there is still snow on the ground.

After we pass over these mountains we drop into another central valley that is undulating to rolling and fairly well dissected in places. Apparently all of the soil good for crops is being used. Here there are many unbunded cultivated fields in well-drained positions being prepared for some crop, perhaps maize.

As we approach Srinagar I see many wet paddy fields in the flood plain and some islands of low mountains in the plain. The valley seems to be nearly surrounded with high snow-capped mountains. The elevation of the valley is about 5,000 to 6,000 feet and the mountains go up as high as 16,000. We arrive at Srinagar at 11:30.

We get into a little old bus and drive rapidly into the city. The almond trees are flowering. I see many poplar trees. Others that are heavily lopped I suppose are some kind of willow. Beds of daffodils are now in bloom. I see the odd field of small grain now about 4 inches high. Many fields are being prepared for some kind of small grain or perhaps maize.

Compared to other parts of India, quite a bit of wood is used here in making fences and houses although brick and stone predominate.

I am told that the population of this town is 125,000. The annual rainfall is 27 inches. Normally the winter temperature does not go below 22° F. but occasionally it goes to 8°. The high temperature in summer is usually 90° F. but sometimes it goes to 100°.

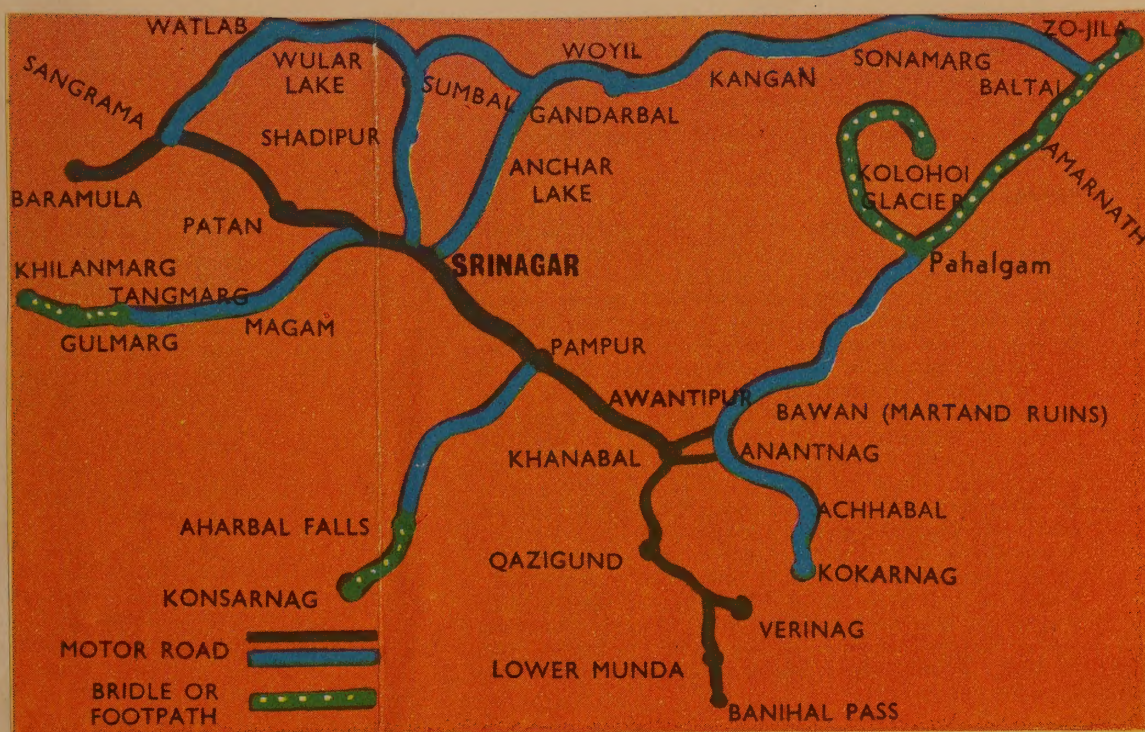
facing ones. Soil is terraced for crops on some of the hillsides where there is still snow on the ground.

After we pass over these mountains we drop into another central valley that is undulating to rolling and fairly well dissected in places. Apparently all of the soil good for crops is being used. Here there are many unbounded cultivated fields in well-drained positions being prepared for some crop, perhaps maize.

As we approach Srinagar I see many wet paddy fields in the flood plain and some islands of low mountains in the plain. The valley seems to be nearly surrounded with high snow-capped mountains. The elevation of the valley is about 5,000 to 6,000 feet and the mountains go up as high as 16,000. We arrive at Srinagar at 11:30.

We get into a little old bus and drive rapidly into the city. The almond trees are flowering. I see many poplar trees. Others that are heavily lopped I suppose are some kind of willow. Beds of daffodils are now in bloom. I see the odd field of small grain now about 4 inches high. Many fields are being prepared for some kind of small grain or perhaps maize.

Compared to other parts of India, quite a bit of wood is used here in making fences and houses although brick and stone predominate. I am told that the population of this town is 125,000. The annual rainfall is 27 inches. Normally the winter temperature does not go below 22° F. but occasionally it goes to 8°. The high temperature in summer is usually 90° F. but sometimes it goes to 100°.



We come to the Palace Hotel beyond the city proper at 12:10.

We register and have our room in a few minutes and then a nice lunch.

About 2:00 p.m. we get into the bus for sightseeing, generally east of the city. This bus was made for little people.

We pass some nicely bedded, wettish alluvial soils that are used mainly for vegetables. The beds are about 12 to 15 inches above the water level in the wide ditches between them. The high irregular terraces above have rather poor almond trees in flower. Some parts of the terrace are gravelly and stony. The better parts have earth terraces with nearly vertical faces and back-sloping surfaces.

This is not a good day for pictures but I try some of the mountains with the almond trees in the foreground. (K-2879)

I judge the upland soils to be Brown Forest.

We walk into the gardens of Chashma Shahi, a Mogul emperor. There are pansies, daffodils, and almonds, but it is a little early for most of the flowers.

We pass many small terraced paddy plots with manure piles on them. Some plots are being soaked with water. Other fields have a poor crop of low mustard. Still others have winter vegetables, especially turnips and cabbage. No doubt some of these are for seed. (K-2880; K-2881)

We then drive to the Shalimar Gardens. Here we see some beautiful Chinar trees, some 5 to 8 feet d.b.h. Here too, the flowers are just beginning. It is cold and windy now and rain threatens. (K-2882) (K-2883)

We come to the Palace Hotel beyond the city proper at 12:10.

We register and have our room in a few minutes and then a nice lunch.

About 2:00 p.m. we get into the bus for sightseeing, generally

east of the city. This bus was made for little people.

We pass some nicely bedded, wetish alluvial soils that are used

mainly for vegetables. The beds are about 12 to 15 inches above the

water level in the wide ditches between them. The high irregular

terraces above have rather poor almond trees in flower. Some parts

of the terrace are gravelly and stony. The better parts have earth

terraces with nearly vertical faces and back-sloping surfaces.

This is not a good day for pictures but I try some of the

mountains with the almond trees in the foreground. (K-2879)

I judge the upland soils to be Brown Forest.

We walk into the gardens of Chashma Shahi, a Mogul emperor.

There are pansies, daffodils, and almonds, but it is a little early

for most of the flowers.

We pass many small terraced paddy plots with manure piles on

them. Some plots are being soaked with water. Other fields have

a poor crop of low mustard. Still others have winter vegetables,

especially turnips and cabbage. No doubt some of these are for

seed. (K-2880; K-2881)

We then drive to the Shalimar Gardens. Here we see some

beautiful Chinna trees, some 5 to 8 feet d.b.h. Here too, the

flowers are just beginning. It is cold and windy now and rain

threatens. (K-2882) (K-2883)



K-2879. April 4, 1959. Near Srinagar. Stone fences on colluvial slope; almond trees and mountains in background.



K-2880. April 4, 1959. Near Srinagar. Bedding for drainage used mostly for vegetables.

K-2879. April 4, 1959. Near Grinnager. Stone fences
on colluvial slope; almond trees and mountains
in background.

K-2880. April 4, 1959. Near Grinnager. Bedding for
drainage used mostly for vegetables.



K-2881. April 4, 1959. Near Srinagar. Vegetable beds with wide drainage ditches; turnips in little boat in foreground.

K-2882. April 4, 1959. Near Srinagar. View of mountains in bad
weather from Shalimar Gardens. Furthest peak said to be
16,000 feet high.



K-2883. April 4, 1959. Near Srinagar.
Mommy with belly warmer at Shalimar
Gardens.

K-5883. April 1, 1959. Near Brimley.
Mummy with belly warmer at Spalmer
Gardens.

Then we drive on and stop at the Nishat Gardens, which are similar to the other Mogul gardens we have seen. A mixture of rain and hail comes and we drive back toward the city (K-2884). Most of the people here appear to be poor, many of them desperately so.

The group goes into a shop to buy cloth. It does not seem to me that the quality is very good. I walk out on the street and try for pictures in the poor light (K-2885; K-2886). Then we drive on to three more shops until I am just about tired out.

We are back to the hotel about 7:45, then dinner, notes for awhile, and to bed.

April 5 (Sunday)

Tea about 7:00 and breakfast at 8:00. There is no rain but the sky is heavily overcast.

At 10:15 we all go by pairs in little boats called shikaras for a ride on Dal Lake at the edge of the city. We see many little islands that start as floating mats. These are gradually covered with mud from the lake and probably some soil from the margins until they are stable and firm. Vegetables are grown. There are even little villages with trees on some of these islands. We come down to a landing near the city at 11:30 and get into the bus. We stop at the tourist office for tea and then go to a carpet factory where we are shown the designing sections and then the looms. This is very exacting work for little pay. Fathers and their sons, I am told, earn together around 2-1/2 rupees a day (about 53¢ U. S.) (K-2887).

Then we drive on and stop at the Nishat Gardens, which are

similar to the other Mogul gardens we have seen. A mixture of rain and hail comes and we drive back toward the city (K-2884). Most of the people here appear to be poor, many of them desper-

ately so.

The group goes into a shop to buy cloth. It does not seem to me that the quality is very good. I walk out on the street and try for pictures in the poor light (K-2885; K-2886). Then we drive on to three more shops until I am just about tired out.

We are back to the hotel about 7:45, then dinner, notes for

awhile, and to bed.

April 5 (Sunday)

Tea about 7:00 and breakfast at 8:00. There is no rain but the

sky is heavily overcast.

At 10:15 we all go by pairs in little boats called shikaras for

a ride on Dal Lake at the edge of the city. We see many little

islands that start as floating mats. These are gradually covered

with mud from the lake and probably some soil from the margins until

they are stable and firm. Vegetables are grown. There are even

little villages with trees on some of these islands. We come down

to a landing near the city at 11:30 and get into the bus. We stop

at the tourist office for tea and then go to a carpet factory where

we are shown the designing sections and then the looms. This is very

exacting work for little pay. Fathers and their sons, I am told,

earn together around 2-1/2 rupees a day (about 53¢ U. S.). (K-2887).



K-2884. April 4, 1959. Near Srinagar. Characteristic terraced area with tall poplars.

K-2884, April 4, 1959. Near Brinagar. Characteristic
terrace area with tall poplars.



K-2885. April 4, 1959. Near Srinagar. Boats on the river at the edge of the city.



K-2886. April 4, 1959. Srinagar. Boats in the Canals.

K-2885. April 4, 1959. Near Sringeri. Boats on
the river at the edge of the city.

K-2886. April 4, 1959. Sringeri. Boats in the
Canals.



K-2887. April 5, 1959. Srinagar. Weaving carpets.



K-2888. April 5, 1959. Srinagar. Family at the doorway.

K-2887. April 2, 1959. Stringer. Weaving carboys.

K-2888. April 2, 1959. Stringer. Family at the doorway.

Then we go to the showroom and Mommy and I go on a rampage and buy two pretty rugs. One is a Tabriz and the other a Princess Bokhara prayer rug.

We are back to the hotel for lunch and then into the bus for a short trip to the northeast. Fortunately it is now bright and sunny. We drive through the old city and out into the country on a good terrace with dark grayish-brown soil. The soil on the middle level seems to be a very fine sandy loam and I judge that at the lower level to be a silty clay loam. The soil is worked into small bunded plots that are level. Apparently most of these are for paddy.

As we drive on, the high terrace narrows and there are hills to the right and low wet paddy land in an old lake bottom to the left.

We pass Ganderbal. The road is partly on low paddy land and partly on dissected higher terrace. In places the surface soil is thin over cobbles in the low terrace. A good deal of the base fill in the valley consists of cobbles and rounded stones spewed out by the mountain streams.

We come to the Sind River at 17.5 miles northeast of Srinagar. Since the bridge is weak we walk across so that the bus may go over empty. This is a typical mountain stream with a broad braided, cobbly, and stony bed like those one sees in Alaska (K-2971). The water has a bit of glacial flour in it. Here there are beautifully terraced paddy fields on gently sloping remnants of a high terrace of very fine sandy loam (K-2972).

Then we go to the showroom and Mommy and I go on a rampage and buy two pretty rugs. One is a Tabriz and the other a Princess Bokhara prayer rug.

We are back to the hotel for lunch and then into the bus for a short trip to the northeast. Fortunately it is now bright and sunny. We drive through the old city and out into the country on a good terrace with dark grayish-brown soil. The soil on the middle level seems to be a very fine sandy loam and I judge that at the lower level to be a silty clay loam. The soil is worked into small bounded plots that are level. Apparently most of these are for paddy. As we drive on, the high terrace narrows and there are hills to the right and low wet paddy land in an old lake bottom to the left. We pass Gandarbal. The road is partly on low paddy land and partly on dissected higher terrace. In places the surface soil is thin over cobbles in the low terrace. A good deal of the base fill in the valley consists of cobbles and rounded stones spewed out by the mountain streams.

We come to the Sind River at 17.5 miles northeast of Srinagar. Since the bridge is weak we walk across so that the bus may go over empty. This is a typical mountain stream with a broad braided, cobble, and scory bed like those one sees in Alaska (K-2971). The water has a bit of glacial flour in it. Here there are beautifully terraced paddy fields on gently sloping remnants of a high terrace of very fine sandy loam (K-2972).



K-2971. April 5, 1959. 17.5 miles northeast of Srinagar.
Looking up the Sind River.



K-2972. April 5, 1959. 17.5 miles northeast of Srinagar.
Across paddy fields into the hills.

K-2911. April 5, 1959. 17.5 miles northeast of Srirangar.
Looking up the Sind River.

K-2912. April 5, 1959. 17.5 miles northeast of Srirangar.
Across paddy fields into the hills.

We drive along on a remnant of the old high terrace, with the river valley to our right and colluvial slopes of low mountains to the left (K-2889). Some patches are too stony even for these land-hungry people (K-2890). At about 20 miles northeast of Srinagar we stop for a few minutes and then turn around. This is an excellent place to see well-bunded, curving plots for paddy. The little plots are level and the bunds well stabilized with grass. Small streams from the mountains furnish water for irrigation. They are lined with boulders to prevent cutting. To the east are beautiful snow-capped mountains (K-2973).

On the way back I try for a few more photographs but time is short. (K-2975; K-2976; K-2891)

All the cattle are small. I don't see how the little bullocks can manage even these crude wooden plows.

We are back to the hotel a little after six and meet Mr. Butt, Director of Agriculture in Kashmir.

He tells me that the very high fields in the mountains have winter wheat and even maize up to around 9,000 feet.

He says the valley here is about 80 miles long and varies in width from three-fourths of a mile to 25 miles. Then there are other small valleys within the mountains. Some have no roads to them.

He speaks of a farming area near Leh at 11,500 feet. The rainfall is only 3 inches all within a three-month period, so all crops are irrigated. They grow wheat, potatoes, peas, and especially small millets.

We drive along on a remnant of the old high terrace, with the river valley to our right and colluvial slopes of low mountains to the left (K-2889). Some patches are too stony even for these land-hungry people (K-2890). At about 20 miles northeast of Srinagar we stop for a few minutes and then turn around. This is an excellent place to see well-bunded, curving plots for paddy. The little plots are level and the bunds well stabilized with grass. Small streams from the mountains furnish water for irrigation. They are lined with boulders to prevent cutting. To the east are beautiful snow-capped mountains (K-2973).

On the way back I try for a few more photographs but time is

short. (K-2975; K-2976; K-2891)

All the cattle are small. I don't see how the little bullocks

can manage even these crude wooden plows.

We are back to the hotel a little after six and meet Mr. Butt,

Director of Agriculture in Kashmir.

He tells me that the very high fields in the mountains have

winter wheat and even maize up to around 9,000 feet.

He says the valley here is about 80 miles long and varies in

width from three-fourths of a mile to 25 miles. Then there are other

small valleys within the mountains. Some have no roads to them.

He speaks of a farming area near Leh at 11,500 feet. The rainfall

is only 3 inches all within a three-month period, so all crops are

irrigated. They grow wheat, potatoes, peas, and especially small millets.



K-2889. April 5, 1959. 20 miles northeast of Srinagar. View across paddy fields into the hills.



K-2890. 20 miles northeast of Srinagar. View from the edge of the village into the mountains.

K-2889. April 5, 1959. 20 miles northeast of Srinagar. View
across paddy fields into the hills.

K-2890. 20 miles northeast of Srinagar. View from the edge of the
village into the mountains.



K-2973. April 5, 1959. 20 miles northeast of Srinagar.
Terrace paddy fields, home, and mountains.



K-2974. April 5, 1959. 20 miles northeast of Srinagar.
A paddy farmer carries his plow.

K-2913. April 5, 1959. 20 miles northeast of Srinagar.
Terrace paddy fields, home, and mountains.

K-2914. April 5, 1959. 20 miles northeast of Srinagar.
A paddy farmer carries his plow.



K-2975. April 5, 1959. 17 miles northeast of Srinagar.
A group of local citizens.



K-2976. April 5, 1959. 17 miles northeast of Srinagar.
Village scene.

K-2975. April 5, 1959. 17 miles northeast of Srinagar.
A group of local citizens.

K-2976. April 5, 1959. 17 miles northeast of Srinagar.
Village scene.



K-2891. April 5, 1959. 17 miles northeast of Srinagar.
Village scene.

K-2891. April 5, 1959. 17 miles northeast of Srinagar.
Village scene.

He tells us that the population of the State is about 1,600,000. They have 900,000 acres of arable land with an average holding of 3.8 acres per rural family. The legislature established a ceiling of 20 acres per family, not counting orchards. The land reform program is nearly completed. Those having more than 20 acres had to give up the extra land without compensation. Most of the released land went to tenants and very little to the landless. Every village is supposed to have some common grazing land but the pressure for cropland has taken most of that.

The small holdings are badly fragmented and the process goes on through inheritance. They hope to start a scheme for land consolidation possibly along with cooperative farming.

50 to 90
In addition to these lands they also have mountain pastures for summer. He speaks of the hill people as "tribal people." Some are settled graziers with cattle and buffalo wintered through on hay. The nomadic graziers have goats and sheep.

Obviously the pressure on land is very great and other alternatives are few except for lowly paid weavers of cloth and rugs, wood carvers, and small metal workers. In winter some farmers go to the plains (as in the Punjab) and work for wages. They are handicapped by limited transport by air and a tortuous mountain road that leads to a rail head 270 miles away.

The people in Kashmir are among the highest in the world in the per capita use of rice - even higher than those in Japan. He says that paddy yields about 3,000 to 4,000 pounds per acre with the

He tells us that the population of the State is about 1,600,000.

They have 900,000 acres of arable land with an average holding of 3.8 acres per rural family. The legislature established a ceiling of 20 acres per family, not counting orchards. The land reform program is nearly completed. Those having more than 20 acres had to give up the extra land without compensation. Most of the released land went to tenants and very little to the landless. Every village is supposed to have some common grazing land but the pressure for cropland has taken most of that.

The small holdings are badly fragmented and the process goes on through inheritance. They hope to start a scheme for land consolidation possibly along with cooperative farming. In addition to these lands they also have mountain pastures for summer. He speaks of the hill people as "tribal people." Some are settled graziers with cattle and buffalo wintered through on hay. The nomadic graziers have goats and sheep.

Obviously the pressure on land is very great and other alternatives are few except for lowly paid weavers of cloth and rugs, wood carvers, and small metal workers. In winter some farmers go to the plains (as in the Punjab) and work for wages. They are handicapped by limited transport by air and a tortuous mountain road that leads to a rail head 270 miles away.

The people in Kashmir are among the highest in the world in the per capita use of rice - even higher than those in Japan. He says that paddy yields about 3,000 to 4,000 pounds per acre with the

Chinese variety 1,039. Local varieties give 2,500 to 3,000 pounds. This is with good manuring but no chemical fertilizer. Their experiments show that moderate applications of ammonium sulphate give 4 maunds of paddy for 1 of fertilizer.

It is a shame they are using ammonium sulphate with this long haul and I urge him as strongly as I can to advocate urea instead, especially for the crops like maize and wheat.

Farmers now get about 25 maunds per acre of maize with hybrid U. S. No. 13 without chemical fertilizer. Under experiments with good manuring and no chemicals they have gotten 61 maunds per acre with U. S. No. 13. Local varieties give 12 maunds. They have 100,000 to 150,000 acres of maize, grown mainly on high, rain-fed fields.

The production of vegetable seeds is increasing, especially those of the brassica group, mainly cabbage. They also have turnips and flower seeds. The market is poorly coordinated. They have just recently established a cooperative union of growers that includes 20 percent of the producers in the State. By rationalization of the market and guaranteed seeds this activity could be increased substantially. It will be necessary to squeeze out the unscrupulous traders in both Kashmir and the receiving States.

They also export apples, cherries, plums, apricots, peaches, and pears. Although we have seen many almonds, he says they do not do well here and that their introduction was a mistake. They get a crop in only about one year in four.

Chinese variety 1,039. Local varieties give 2,500 to 3,000 pounds. This is with good manuring but no chemical fertilizer. Their experiments show that moderate applications of ammonium sulphate give 4 mounds of paddy for 1 of fertilizer. It is a shame they are using ammonium sulphate with this long haul and I urge him as strongly as I can to advocate urea instead, especially for the crops like maize and wheat. Farmers now get about 25 mounds per acre of maize with hybrid U. S. No. 13 without chemical fertilizer. Under experiments with good manuring and no chemicals they have gotten 61 mounds per acre with U. S. No. 13. Local varieties give 12 mounds. They have 100,000 to 150,000 acres of maize, grown mainly on high, rain-fed fields. The production of vegetable seeds is increasing, especially those of the brassica group, mainly cabbage. They also have turnips and flower seeds. The market is poorly coordinated. They have just recently established a cooperative union of growers that includes 30 percent of the producers in the State. By rationalization of the market and guaranteed seeds this activity could be increased substantially. It will be necessary to squeeze out the unscrupulous traders in both Kashmir and the receiving States. They also export apples, cherries, plums, apricots, peaches, and pears. Although we have seen many almonds, he says they do not do well here and that their introduction was a mistake. They get a crop in only about one year in four.

They can neither import sugar nor grow it. They produce honey but much of that is exported.

I am very much impressed with this man. He has a difficult problem to improve the agriculture of these poor and isolated people in the largest farming community within the Himalayan Range.

Mr. Butt leaves about 7:30, then dinner, notes for awhile, and to bed.

April 6

This is a bright sunny morning. We have breakfast at 7:30 and leave at 9:00 for a short trip north of Srinagar. As we go through the city, I note that the tongas are pulled by small horses. One sees few bullock carts in the city but many carts are pulled or pushed by men.

Beyond the city we pass well-cared-for intensively cultivated vegetable gardens on dark brown alluvial-lacustrine material. The wettest parts are used for paddy.

Then we come to very wet paddy land being plowed with small bullocks wading some 20 inches in water (K-2896).

About 4 miles out we stop at the village of Malour (K-2892; K-2895). The population is said to be 1,200. The 100 cultivators average less than 4 acres each. They grow paddy, maize, and some mustard. It is said that some improvements have been made with loans from the government. They have cooperative stores. There is neither a midwife nor a dispensary; they help one another! Only from this year have they had a school. The teacher comes from Srinagar.

They can neither import sugar nor grow it. They produce honey

but much of that is exported.

I am very much impressed with this man. He has a difficult

problem to improve the agriculture of these poor and isolated

people in the largest farming community within the Himalayan Range.

Mr. Butt leaves about 7:30, then dinner, notes for awhile, and

to bed.

April 6

This is a bright sunny morning. We have breakfast at 7:30 and

leave at 9:00 for a short trip north of Srinagar. As we go through

the city, I note that the tongas are pulled by small horses. One

sees few bullock carts in the city but many carts are pulled or

pushed by men.

Beyond the city we pass well-cared-for intensively cultivated

vegetable gardens on dark brown alluvial-lacustrine material. The

wettest parts are used for paddy.

Then we come to very wet paddy land being plowed with small

bullocks wading some 20 inches in water (K-2896).

About 4 miles out we stop at the village of Malour (K-2892; K-2895).

The population is said to be 1,200. The 100 cultivators average less

than 4 acres each. They grow paddy, maize, and some mustard. It is

said that some improvements have been made with loans from the

government. They have cooperative stores. There is neither a midwife

nor a dispensary; they help one another! Only from this year have they

had a school. The teacher comes from Srinagar.



K-2896. April 6, 1959. 4 miles north of Srinagar, Malour Village.
Plowing the wet paddy land.

K-2896. April 6, 1959. 4 miles north of Srinagar, Jhelum Village.
Flowing the wet paddy land.



K-2892. April 6, 1959. 4 miles north of Srinagar, Malour
View in village.



K-2893. April 6, 1959. 4 miles north of Srinagar, Malour Village.
Village scene.

K-2892. April 6, 1959. 4 miles north of Srinagar, Malom.
View in village.

K-2893. April 6, 1959. 4 miles north of Srinagar, Malom Village.
Village scene.



K-2894. April 6, 1959. 4 miles north of Srinagar, Malour Village. Village scene.



K-2895. April 6, 1959. 4 miles north of Srinagar, Malour Village. Village scene.

K-2894. April 6, 1959. 4 miles north of Srinagar,
Malour Village. Village scene.

K-2895. April 6, 1959. 4 miles north of Srinagar,
Malour Village. Village scene.

The cattle are very small (K-2893). They have a few sheep and chickens. They seem to have no fruit.

Many of the children have shaved heads to help control the lice.

The small homes have mud walls with low partitions for rooms for people and animals. Most have storage lofts. Things are stored inside by tying in bundles and suspending from the ceiling. The only "furniture" in the one I visit is a tiny mustard-oil-lamp -- no beds, tables, or chairs. Many of the women are patching the walls now with mud.

The "streets" are very muddy and manure-strewn. I see one woman spinning wool for home use (K-2977) and another grinding maize in a large stone mortar (K-2894).

Off to the side is a small group of even smaller and poorer homes for the landless laborers.

The women have many great silver bracelets and other ornaments (K-2978). Each has all the family savings fastened on herself I suppose.

I hurry to get photos as we must go back soon.

On the way back to the hotel, we wait for over an hour while various ones do more shopping. It is difficult to go about the streets because of the beggars and shopkeepers trying to get one to look at their wares.

Finally we get back to the hotel at noon. Then pack, lunch, and to the airfield at 2:10 p.m. We are in the air for Delhi at 2:44.

The cattle are very small (K-2893). They have a few sheep and

chickens. They seem to have no fruit.

Many of the children have shaved heads to help control the lice.

The small homes have mud walls with low partitions for rooms for

people and animals. Most have storage lofts. Things are stored

inside by tying in bundles and suspending from the ceiling. The only

"furniture" in the one I visit is a tiny mustard-oil-lamp -- no beds,

cables, or chairs. Many of the women are patching the walls now with

mud.

The "streets" are very muddy and manure-strewn. I see one woman

spinning wool for home use (K-2977) and another grinding maize in a

large stone mortar (K-2894).

Off to the side is a small group of even smaller and poorer homes

for the landless laborers.

The women have many great silver bracelets and other ornaments

(K-2978). Each has all the family savings fastened on herself I

suppose.

I hurry to get photos as we must go back soon.

On the way back to the hotel, we wait for over an hour while

various ones do more shopping. It is difficult to go about the

streets because of the beggars and shopkeepers trying to get one

to look at their wares.

Finally we get back to the hotel at noon. Then pack, lunch,

and to the airfield at 2:10 p.m. We are in the air for Delhi at

2:44.



K-2977. April 6, 1959. 4 miles north of Srinagar. Spinning.



K-2978. April 6, 1959. 4 miles north of Srinagar. Young village woman.

K-2517. April 6, 1959. 4 miles north of Srinagar. Spinning.

K-2518. April 6, 1959. 4 miles north of Srinagar. Young
village woman.

Just after take-off, we pass over beautifully terraced small
old dissected terraces.



Then dinner, back treatment, sleep, and to bed.
K-2979. April 6, 1959. Srinagar. Woman in purdah.

K-249. April 6, 1959. Stringer. Woman in burqa.

Just after take-off, we pass over beautifully terraced small fields on old dissected terraces.

At about 25 to 40 miles south of the airfield, the valley terraces are quite dissected and uneven. Yet nearly all the land is cultivated. The villages are about one-fourth to one mile apart.

As we go over the pass I have a better view of the tiny, narrow, curving, terraced fields. Many have winter wheat; and some are probably for maize. In the mountains the pattern varies from scattered farms to open villages. Most of the houses and villages appear to have no road.

The rest of the way in is about like that I previously described. We are down in Delhi at 5:05 and are back in our hotel at 5:30.

I work partly on packing but mostly on review of the badly edited section of our report on chemical fertilizers.

Then dinner, back treatment, notes, and to bed.

Just after take-off, we pass over beautifully terraced small

fields on old dissected terraces.

At about 25 to 40 miles south of the airfield, the valley

terraces are quite dissected and uneven. Yet nearly all the land

is cultivated. The villages are about one-fourth to one mile apart.

As we go over the pass I have a better view of the tiny, narrow,

curving, terraced fields. Many have winter wheat; and some are

probably for maize. In the mountains the pattern varies from

scattered farms to open villages. Most of the houses and villages

appear to have no road.

The rest of the way in is about like that I previously described.

We are down in Delhi at 5:05 and are back in our hotel at 5:30.

I work partly on packing but mostly on review of the badly edited

section of our report on chemical fertilizers.

Then dinner, pack treatment, notes, and to bed.

April 7

For some reason I do not sleep after 4:30. I about wind up my packing and we go to breakfast.

Just as I finish, Dr. Ralph Cummings calls. I go with him to his office and we have a pleasant chat about the work of the team, of the Rockefeller Foundation, and of the ICA.

We talk about present and potential agricultural programs for India. Like me, he feels that they have at most ten years to improve the food supply or have a political revolution the outcome of which no one can predict. We agree that the top Indians work very hard and that some way should be found to get some hard-working competent Americans on the job here to help them.

Dr. Cummings' driver takes me back to the hotel about 10:35. I gather up the remainder of things to send back and go over to the Ford Foundation with books and papers and with the two rugs that we bought the other day in Kashmir. I also get the so-called final draft of the section on Soil and water conservation for the report. I come back to the hotel and start to work on this.

After lunch with the Cottons, I finish this review and Mommy and I complete our packing.

At 5:30 we go to the airport and check in for the flight to Calcutta. It is very warm now. We say goodbye to Dr. Raychaudhuri and Secretary Damle. The Ensmingers and Beers are down to see us off along with Jerry Huffman who will go on with us as far as Bangkok. We are in the air at 6:34 p.m. We have a nice dinner on the plane. Mommy gets a good sleep. I nod a little but don't really sleep.

April 7

For some reason I do not sleep after 4:30. I about wind up

my packing and we go to breakfast.

Just as I finish, Dr. Ralph Cummings calls. I go with him

to his office and we have a pleasant chat about the work of the

team, of the Rockefeller Foundation, and of the ICA.

We talk about present and potential agricultural programs for

India. Like me, he feels that they have at most ten years to improve

the food supply or have a political revolution the outcome of which

no one can predict. We agree that the top Indians work very hard and

that some way should be found to get some hard-working competent

Americans on the job here to help them.

Dr. Cummings' driver takes me back to the hotel about 10:35.

I gather up the remainder of things to send back and go over to the

Ford Foundation with books and papers and with the two rugs that we

bought the other day in Kashmir. I also get the so-called final

draft of the section on Soil and water conservation for the report.

I come back to the hotel and start to work on this.

After lunch with the Gottons, I finish this review and Mommy and

I complete our packing.

At 5:30 we go to the airport and check in for the flight to

Calcutta. It is very warm now. We say goodbye to Dr. Raychaudhuri

and Secretary Damsie. The Ensmingers and Beers are down to see us off

along with Jerry Huffman who will go on with us as far as Bangkok.

We are in the air at 6:34 p.m. We have a nice dinner on the plane.

Mommy gets a good sleep. I nod a little but don't really sleep.

We are down in Calcutta at 9:35. An agent for American Express meets us and takes over all of the many papers and forms for leaving India and handles the baggage. We sit around and talk, drink tea, and wait.

At 11:40 we pass through the customs controls and wait some more while one day passes to another.

April 8

As this day begins we are still waiting to board the plane to fly from Calcutta to Bangkok via Air India. Almost at the last minute I discover that one of my bags was not properly marked in customs. I identify it and it goes to the plane, I hope.

We get on the plane and are in the air at 12:55, which is 2:25 a.m. Bangkok time.

This is a comfortable plane and I have a bit of sleep, but very little breakfast.

We are down in the airport at Bangkok at 6:01 a.m., just 12 hours earlier than Washington time. The people here are very courteous and the formalities simple. Then I find that our schedule to Saigon is changed from early morning to very early morning. We are scheduled to leave the hotel at 2:40 a.m. the 10th and are supposed to be in the air at 4:40 a.m.

Already it is very warm here. We get into the bus and wait. We finally leave for the city at 6:45.

We are down in Calcutta at 9:35. An agent for American Express meets us and takes over all of the many papers and forms for leaving India and handles the baggage. We sit around and talk, drink tea, and wait. At 11:40 we pass through the customs controls and wait some more while one day passes to another.

April 8

As this day begins we are still waiting to board the plane to fly from Calcutta to Bangkok via Air India. Almost at the last minute I discover that one of my bags was not properly marked in customs. I identify it and it goes to the plane, I hope. We get on the plane and are in the air at 12:25, which is

2:25 a.m. Bangkok time.

This is a comfortable plane and I have a bit of sleep, but

very little breakfast.

We are down in the airport at Bangkok at 6:01 a.m., just 12

hours earlier than Washington time. The people here are very courteous and the formalities simple. Then I find that our schedule to Saigon is changed from early morning to very early morning. We

are scheduled to leave the hotel at 2:40 a.m. the 10th and are

supposed to be in the air at 4:40 a.m.

Already it is very warm here. We get into the bus and wait.

We finally leave for the city at 6:45.

We drive mainly south on an alluvial plain that is normally ill drained but now the water table is fairly well down, say at 2 to 4 feet. The surface soils are grayish-brown to dark gray. Most of the land is banded for paddy. Now most fields have grass on them. The vegetation here is green and lush. Although I see some water buffalo there is no overgrazing nor evidence of extreme pressure to use every square foot.

As we drive along I see some curiously shaped buildings, some of which are doubtless temples. We pass many poor, crowded houses in bad repair. Some of these have two stories. Then there are some nice houses, apartments, and public buildings with paddy fields between clusters of buildings and back from the road.

The poor houses are built on posts (suggesting high water part of the time) while the good ones are set upon man-made terraces about 2 to 4 feet high. Some houses have gardens with bananas, mangoes, papaya, and palms. A few of the nicer ones have bougainvillea and other vines and shrubs.

Around 7:10, perhaps 10 or 12 miles, we enter an older more completely built-up part of the city. But even here I see a few commercial vegetable gardens.

As we drive along I see live hogs taken to market in a way I've never seen before. These are large ones. Each one is tightly confined in a coarse-meshed basket. They are piled in the truck like short logs. It must be very uncomfortable for the ones on the bottom.

We drive mainly south on an alluvial plain that is normally ill drained but now the water table is fairly well down, say at 2 to 4 feet. The surface soils are grayish-brown to dark gray. Most of the land is bounded for paddy. Now most fields have grass on them. The vegetation here is green and lush. Although I see some water buffalo there is no overgrazing nor evidence of extreme pressure to use every square foot.

As we drive along I see some curiously shaped buildings, some of which are doubtless temples. We pass many poor, crowded houses in bad repair. Some of these have two stories. Then there are some nice houses, apartments, and public buildings with paddy fields between clusters of buildings and back from the road. The poor houses are built on posts (suggesting high water part of the time) while the good ones are set upon man-made terraces about 2 to 4 feet high. Some houses have gardens with bananas, mangoes, papaya, and palms. A few of the nicer ones have bougainvillea and other vines and shrubs.

Around 7:10, perhaps 10 or 12 miles, we enter an older more completely built-up part of the city. But even here I see a few commercial vegetable gardens.

As we drive along I see live hogs taken to market in a way I've never seen before. These are large ones. Each one is tightly confined in a coarse-meshed basket. They are piled in the truck like short logs. It must be very uncomfortable for the ones on the bottom.

I am getting very hungry and yet we have quite a long wait while a passenger leaves the bus. Apparently he has no local currency.

We reach the Plaza Hotel and check in about 7:30 and then go to breakfast. Happily, the dining room and our bedroom are air-conditioned. Finally to bed.

About 1:00 p.m. we have lunch and then go to check our tickets with Air France and arrange for a tour on the river tomorrow morning.

We drive around the city a bit for some shopping. The streets are crowded and very hot indeed - about like Washington on a hot July day. We buy some bronze flat ware from S. Samran Thailand Co., 377/1 Petchaburi Road to be sent home and are back to the hotel for tea at 4:15. Dinner at 7:30, a short walk, and bed.

April 9

At 7:30 a car from the Tourist Agency calls for us and we go to a boat landing on the Menam Chao Phraya River. In 10 minutes we are out in a little motor launch on the main stream. We see a great profusion of boats from very tiny canoes to good-sized launches and modern freighters. There are shops of all kinds and much wholesale and retail trading is done along the shores. In places the houses are quite thick. People are swimming, bathing, and washing clothes in the river water (K-2980). But they don't drink it. Men have fair-sized boats loaded with huge metal open tanks from which they sell drinking water.

I am getting very hungry and yet we have quite a long wait while a passenger leaves the bus. Apparently he has no local currency. We reach the Plaza Hotel and check in about 7:30 and then go to breakfast. Happily, the dining room and our bedroom are air-conditioned. Finally to bed.

About 1:00 p.m. we have lunch and then go to check our tickets with Air France and arrange for a tour on the river tomorrow morning. We drive around the city a bit for some shopping. The streets are crowded and very hot indeed - about like Washington on a hot July day. We buy some bronze flat ware from S. Samran Thailand Co., 377/1 Petchaburi Road to be sent home and are back to the hotel for tea at 4:15. Dinner at 7:30, a short walk, and bed.

April 9

At 7:30 a car from the Tourist Agency calls for us and we go to a boat landing on the Menam Chao Phraya River. In 10 minutes we are out in a little motor launch on the main stream. We see a great profusion of boats from very tiny canoes to good-sized launches and modern freighters. There are shops of all kinds and much wholesale and retail trading is done along the shores. In places the houses are quite thick. People are swimming, bathing, and washing clothes in the river water (K-2980). But they don't drink it. Men have fair-sized boats loaded with huge metal open tanks from which they self drinking water.



K-2980. April 9, 1959. Thailand. Bangkok. View on the Menam Chao Phraya River. (Swimmers).

K-2980. April 9, 1959. Thailand. Bangkok. View on the Menam
Chao Phraya River. (Swimmers).

It is amazing how they load these boats with coal, earthen pots, lumber, and just about everything. Apparently goods can be piled much higher on a boat than on a truck. Here and there people are fishing with nets. On the right bank most of the houses are next to the river or along one of the many canals leading from it. Some of these families raise bananas, coconuts, mangoes, and perhaps other fruits and vegetables.

We pass a rather congested retail market area with lots of boats. Here on this river many people live in the boats.

We leave the river and wind around through some of the canals and make two stops (K-2981). The first is to see the royal barges. These are very long boats rowed by some 40 to 60 men. Both the fronts and backs are very high and elaborately carved and painted. In the same warehouse are thrones that are placed on the coronation barge.

Then we stop to visit the oldest of the Buddhist temples in Bangkok - the Temple of Dawn. This is very elaborately carved and much of it is newly and brightly painted.

I try several kodachromes along the way. Some of them should have some color in them anyway.

We are back at the landing area about 10:10, take tea and rest a bit at the Oriental Hotel, shop for awhile, then return to our hotel for lunch.

About 3:00 p.m. we take another short shopping tour for a star sapphire. The heat is terrific. By 4:30 we are back in our air-conditioned room. Then notes and rest until dinner. We pack and are ready for bed at 8:30.

It is amazing how they load these boats with coal, earthen pots, lumber, and just about everything. Apparently goods can be piled much higher on a boat than on a truck. Here and there people are fishing with nets. On the right bank most of the houses are next to the river or along one of the many canals leading from it. Some of these families raise bananas, coconuts, mangoes, and perhaps other fruits and vegetables.

We pass a rather congested retail market area with lots of boats. Here on this river many people live in the boats.

We leave the river and wind around through some of the canals and make two stops (K-2981). The first is to see the royal barges. These are very long boats rowed by some 40 to 60 men. Both the fronts and backs are very high and elaborately carved and painted. In the same warehouse are thrones that are placed on the coronation barge.

Then we stop to visit the oldest of the Buddhist temples in Bangkok - the Temple of Dawn. This is very elaborately carved and much of it is newly and brightly painted.

I try several Kodachromes along the way. Some of them should have some color in them anyway.

We are back at the landing area about 10:10, take tea and rest a bit at the Oriental Hotel, shop for awhile, then return to our hotel for lunch.

About 3:00 p.m. we take another short shopping tour for a star sapphire. The heat is terrific. By 4:30 we are back in our air-conditioned room. Then notes and rest until dinner. We pack and are ready for bed at 8:30.



K-2981. April 9, 1959. Thailand, Bangkok.
A typical small side canal from the river.

K-2981. April 9, 1959. Thailand, Bangkok.
A typical small side canal from the river.





April 10

We are up at 2:15 a.m. The Air France bus picks us up at 2:52. At 3:30 we arrive at the airfield, check in, and have tea and toast. It must be that all the passengers are here since we get on the plane 20 minutes ahead of time. We are in the air at 4:30. By 5:30 it is light but too misty to see the ground.

As we come down near Saigon I see nearly flat grayish-brown dry fields, probably for paddy. The wheels are down in Saigon at 6:15. As I feared no one meets us because we are not expected until 8:15. The hostess calls and finds that we are expected at the Majestic Hotel. So we drive in on the little airport bus. For a little way we drive over nearly flat light gray soil, but just as we enter the city the soil is brown and appears to have laterite beneath.

We register at the hotel at 7:15 and go to breakfast. While at breakfast the people that went out to meet us come in. These include:

Dr. Frank Moormann

M. Telles de Vasconcelles, FAO Country Representative

M. Lam Van Vang, Director of Agricultural Research

M. Nguyen-Pant-Tan, private secretary of the Ministry of Agriculture, and others

We have a discussion about the program. Two of the men take a look at our room and decide that it is not suitable.

April 10

We are up at 2:15 a.m. The Air France bus picks us up at 2:25. At 3:30 we arrive at the airfield, check in, and have tea and toast. It must be that all the passengers are here since we get on the plane 20 minutes ahead of time. We are in the air at 4:30. By 5:30 it is light but too misty to see the ground.

As we come down near Saigon I see nearly flat grayish-brown dry fields, probably for paddy. The wheels are down in Saigon at 6:15. As I feared no one meets us because we are not expected until 8:15. The hostess calls and finds that we are expected at the Majestic Hotel. So we drive in on the little airport bus. For a little way we drive over nearly flat light gray soil, but just as we enter the city the soil is brown and appears to have laterite beneath.

We register at the hotel at 7:15 and go to breakfast. While at breakfast the people that went out to meet us come in. These

include:

Dr. Frank Moormann

M. Tellez de Vasconcelles, FAO Country Representative

M. Lam Van Vang, Director of Agricultural Research

M. Nguyen-Pan-Tan, private secretary of the Ministry of Agriculture, and others

We have a discussion about the program. Two of the men take a

look at our room and decide that it is not suitable.

While we go to check our tickets at Air France our things are moved to another room. As we check our tickets we discover that we must have exit visas! So we leave our passports. I buy some black and white film but find no kodachrome that fits my camera.

While on the street I discover some bad longish holes in my suit coat apparently caused by acid. What a mess! I take it to a tailor who says that he can have it by tomorrow evening.

We have a brief tea chez Moormann and I go back to the hotel to change to the one other suit that I have. I find that the hotel boys have put us up in a beautiful three-room air-conditioned suite.

At 11:00 I am taken in the Ford ranch wagon put at my disposal to a conference with the Minister of Agriculture - M. Le-Van-Dong. He seems to be a very pleasant man indeed. We begin by discussing the cat clay problem - what causes cat clay, the bad effects of drainage, and how such soils are used. Not only is the high acidity toxic to plants, but also at such extreme acidities aluminum and manganese become soluble and toxic. I point out frankly that none of us really knows exactly the point on the scale from very badly to slightly affected soils where the line falls between practical farming and impractical development. Certainly no one knows now how to reclaim the bad ones at anything like reasonable cost. Lime could be applied at something like 150 metric tons per hectare but the cost would be outrageous and I would suspect that such high rates

While we go to check our tickets at Air France our things are moved to another room. As we check our tickets we discover that we must have exit visas! So we leave our passports. I buy some black and white film but find no Kodachrome that fits my camera.

While on the street I discover some bad longish holes in my suit coat apparently caused by acid. What a mess! I take it to a tailor who says that he can have it by tomorrow evening.

We have a brief tea chez Moormann and I go back to the hotel to change to the one other suit that I have. I find that the hotel boys have put us up in a beautiful three-room air-conditioned suite. At 11:00 I am taken in the Ford ranch wagon but at my disposal to a conference with the Minister of Agriculture - M. Je-Van-Dong. He seems to be a very pleasant man indeed. We begin by discussing the cat clay problem - what causes cat clay, the bad effects of drainage, and how such soils are used. Not only is the high acidity toxic to plants, but also at such extreme acidities aluminum and manganese become soluble and toxic. I point out frankly that none of us really knows exactly the point on the scale from very badly to slightly affected soils where the line falls between practical farming and impractical development. Certainly no one knows how to reclaim the bad ones at anything like reasonable cost. Lime could be applied at something like 150 metric tons per hectare but the cost would be outrageous and I would suspect that such high rates

of liming might cause serious nutrient unbalance, which would also need to be corrected.

He says that their French advisers are pushing them to go ahead. I tell him frankly that I doubt the French understand the problem. So far as I know they haven't these soils in France nor do they have any soil scientist here.

I explain that soil acidity has greater effects on some crops than others. Sugarcane for example does well on moderately to strongly acid soils.

Then the conversation turns to tropical soils generally and why there are so many contrasting kinds even under good tropical forests.

The Minister says that his government must now make a decision between two general courses of action: (1) To go ahead with the development of the cat clay area or (2) develop the red upland soils of plateaus back away from the sea. The Vietnamese people prefer to live near the sea.

My schedule calls for me seeing cat clays and some of the upland soils from old terraces. Then I shall try to see the Minister for awhile Sunday evening.

Gradually the conversation shifts to the prospects in under-developed countries generally with special reference to India, China, and the USSR. The Minister feels that the recent actions of Red China in Tibet have seriously hurt the Communist Party in other parts of Asia.

in Tibet have seriously hurt the Communist Party in other parts of and the USSR. The Minister feels that the recent actions of Red China, developed countries generally with special reference to India, China, and the USSR. The Minister feels that the recent actions of Red China, while Sunday evening.

soils from old terraces. Then I shall try to see the Minister for My schedule calls for me seeing cat clays and some of the upland to live near the sea.

of plateaus back away from the sea. The Vietnamese people prefer development of the cat clay area or (2) develop the red upland soils between two general courses of action: (1) To go ahead with the

The Minister says that his government must now make a decision forests.

why there are so many contrasting kinds even under good tropical Then the conversation turns to tropical soils generally and strongly acid soils.

than others. Sugarcane for example does well on moderately to I explain that soil acidity has greater effects on some crops nor do they have any soil scientist here.

the problem. So far as I know they haven't these soils in France ahead. I tell him frankly that I doubt the French understand He says that their French advisers are pushing them to go

also need to be corrected. of liming might cause serious nutrient imbalance, which would

I find the Minister very friendly and intelligent. I take my leave and return to the hotel.

Then I have lunch, rest awhile, and go with Moormann for a talk with Mr. McCauly, Acting Director of USOM. He tells me that he is an engineer but has been in foreign work for several years. He strikes me as a bit lackadaisical, but that may be just a mannerism. He says that Viet Nam would not last any time at all without the American aid. Although a democracy, I am given to understand that the President rules with a fairly heavy hand. He has a practice of setting up all sorts of special units of government that report directly to him. Some of these raid the older ministries of personnel and duplicate their activities.

Although the population is increasing at about 3 percent per year, partly by refugees from Communist North Viet Nam, there is no shortage of food. Last year rice was available for export and will be again this year. But there is a shortage of economic opportunity. There is a great deal of available land in the hills but it is hard to get the coastal people to move there because water is not abundant. The present hill people are tribal and matriarchal, apparently somewhat like those in Assam. But since there is plenty of land they practice nomadic shifting cultivation and it is hard to get them to settle down. I take it from the vague description of Moormann that many of the fallows have been overcropped in the past and invaded with grasses that annually burn. Some areas, he says, have Red-Yellow

I find the Minister very friendly and intelligent. I take

my leave and return to the hotel.

Then I have lunch, rest awhile, and go with Moormann for a talk with Mr. McCaully, Acting Director of USOM. He tells me that he is an engineer but has been in foreign work for several years. He strikes me as a bit lackadaisical, but that may be just a mannerism. He says that Viet Nam would not last any time at all without the American aid. Although a democracy, I am given to understand that the President rules with a fairly heavy hand. He has a practice of setting up all sorts of special units of government that report directly to him. Some of these told the older ministries of personnel and duplicate their activities.

Although the population is increasing at about 3 percent per year, partly by refugees from Communist North Viet Nam, there is no shortage of food. Last year rice was available for export and will be again this year. But there is a shortage of economic opportunity. There is a great deal of available land in the hills but it is hard to get the coastal people to move there because water is not abundant. The present hill people are tribal and matriarchal, apparently somewhat like those in Assam. But since there is plenty of land they practice nomadic shifting cultivation and it is hard to get them to settle down. I take it from the vague description of Moormann that many of the fallows have been overcropped in the past and invaded with grasses that annually burn. Some areas, he says, have Red-Yellow

Podzolic soils with khasi pine. They are trying now to move some of the coastal people and to get some of the nomadic ones to settle down with industrial crops. They are expanding kenaf and ramie. Cotton is grown in only a few spots. In a few poor areas mulberries are grown for silkworms. It seems to me a pity that these people are not self-sufficient in cotton and silk textiles. They make some baskets and hats from coarse reeds and things of that sort. They make nice lacquer boxes, dishes, and the like, but I am told that cottage industries are not developed here as in many other parts of Asia. Some effort is being made to develop them more. One American is trying to get them to make ^{their} unique ladies' hats in a way to appeal to an affluent American clientele. They have some poor coal deposits and some possibilities for hydro-electric power. But the big coal deposits and industry of the original French colony are near Hanoi in North Viet Nam.

I then go over to the Directorate of Agricultural Research and speak briefly with Mr. Lam Van Vang, Director.

I am taken to the soil laboratory. They now have two soil survey parties in the field. I look at one soil map that seems quite nice on a scale of 1:20,000. In the future they plan to do most of their work at around 1:20,000 and compile it at 1:50,000. I am shown small maps of stations at around 1:10,000. Dr. Moormann introduces me to some of the Vietnamese staff as follows:

Bui-Huu-Tri, Chief, Soil Fertility Bureau; Nguyen Hoai Van, in charge of the cartographic section and soil survey party chief;

Podsolis soils with khaai pine. They are trying now to move some of the coastal people and to get some of the nomadic ones to settle down with industrial crops. They are expanding kenaf and ramie. Cotton is grown in only a few spots. In a few poor areas mulberries are grown for silkworms. It seems to me a pity that these people are not self-sufficient in cotton and silk textiles. They make some baskets and hats from coarse reeds and things of that sort. They make nice lacquer boxes, dishes, and the like, but I am told that cottage industries are not developed here as in many other parts of Asia. Some effort is being made to develop them more. One American is trying to get them to make ^{their} unique ladies' hats in a way to appeal to an affluent American clientele. They have some poor coal deposits and some possibilities for hydro-electric power. But the big coal deposits and industry of the original French colony are near Hanoi in North Viet Nam.

I then go over to the Directorate of Agricultural Research and speak briefly with Mr. Lam Van Vang, Director.

I am taken to the soil laboratory. They now have two soil survey parties in the field. I look at one soil map that seems quite nice on a scale of 1:20,000. In the future they plan to do most of their work at around 1:20,000 and compile it at 1:50,000. I am shown small maps of stations at around 1:10,000. Dr. Moormann introduces me to some of the Vietnamese staff as follows:

Bui-Huu-Tri, Chief, Soil Fertility Bureau; Nguyen Hoa Van, in charge of the cartographic section and soil survey party chief;

Truong Dinh Phu, Chief, Soil Survey Section and soil survey party chief; and the first two had training in the Philippines. Mr. Van worked under Dr. Cline. Mr. Phu had training at the University of Illinois.

They have quite a program of fertility trials on cultivators' fields, which had been explained to me by Dr. Ignatieff. (This is sometimes called the Murkajee system.) This year they have about 300 sets of plots. Two hundred of these have only 4 plots: (1) check; (2) 30 kilograms N per hectare; (3) 30 kilograms P_2O_5 hectare; and (4) 30 kilograms K_2O per hectare. One hundred of them have 8 or more plots including combinations of these treatments in addition. They also are experimenting with different levels for the different crops.

I don't think I have ever been hotter in my life than in this little laboratory building that sets in a little courtyard surrounded by high walls. I can feel the sweat running down my back, arms, and legs; and when they see it drip off my face they turn on a fan.

About 5:30 p.m. I go back to the hotel and put on a coat! Mommy and I go to a reception being given for us by the Minister of Agriculture. We stand in the receiving line for two solid hours from 6:00 p.m. until 8:00 (and remembering all the time that we had gotten up at 2:15 a.m.). There are a large number of guests, somewhat over 200. Finally it is over. We hurry through dinner and get to our room at 9:00 p.m. Again we praise the Lord for air-conditioning.

Truong Dinh Phu, Chief, Soil Survey Section and soil survey party chief; and the first two had training in the Philippines. Mr. Van worked under Dr. Cline. Mr. Phu had training at the University of

Illinois.

They have done a program of fertility trials on cultivators' fields, which had been explained to me by Dr. Ignatieff. (This is sometimes called the Murkajee system.) This year they have about

300 sets of plots. Two hundred of these have only 4 plots: (1) check; (2) 30 kilograms N per hectare; (3) 30 kilograms P_2O_5 per hectare; and (4) 30 kilograms K_2O per hectare. One hundred of them have 8 or

more plots including combinations of these treatments in addition. They also are experimenting with different levels for the different

crops.

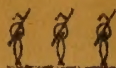
I don't think I have ever been hotter in my life than in this little laboratory building that sits in a little courtyard surrounded by high walls. I can feel the sweat running down my back, arms, and legs; and when they see it drip off my face they turn on a fan.

About 5:30 p.m. I go back to the hotel and put on a coat! Mommy

and I go to a reception being given for us by the Minister of Agriculture. We stand in the receiving line for two solid hours from 6:00 p.m. until 8:00 (and remembering all the time that we had gotten up at 2:15 a.m.). There are a large number of guests, somewhat over 200. Finally it is over. We hurry through dinner and get to our room at 9:00 p.m. Again we praise the Lord for air-conditioning.

SERVICE DE PEDOLOGIE

SECTION DE FERTILITE PROGRAMME TECHNIQUE POUR L'ANNEE 1959.



I.- EXPERIENCES D'ENGRAIS SUR LE RIZ.

A.- Les nouvelles régions à établir, (c'est-à-dire Régions de Bèn-Tre, Mo-Cây, My-Tho, Hue-Quangtri etc...) auront 4 ou 5 traitements d'engrais par champ d'essai. On utilisera la même procédure et les mêmes doses d'engrais (30 kg N; 30 kg P_2O_5 ; 30 kg K_2O à l'hectare) que celles préconisées l'année dernière.

B.- Les résultats obtenus des champs d'essai déjà existants détermineront la formule d'engrais à appliquer cette année. En principe, les 3 formules suivantes sont préconisées.

Type I : O, N, P, K, NP, NK, PK, NPK

avec 30 kg N/ha
30 kg P_2O_5 /ha
30 kg K_2O /ha

Type II : O, N_1 , N_2 , P_1 , N_2P_1 , N_2P_2 , $N_2P_2K_1$, $N_2P_2K_2$ (1)

avec N_1 = 20 kg N/ha
 N_2 = 40 kg N/ha
 P_1 = 20 kg P_2O_5 /ha
 P_2 = 40 kg P_2O_5 /ha
 K_1 = 20 kg K_2O /ha
 K_2 = 40 kg K_2O /ha

Type III : O, P_1 , P_2 , N_1 , P_2N_1 , P_2N_2 , $P_2N_2K_1$, $P_2N_2K_2$ (2)

avec N_1 = 20 kg N/ha
 N_2 = 40 kg N/ha
 P_1 = 30 kg P_2O_5 /ha
 P_2 = 60 kg P_2O_5 /ha
 K_1 = 20 kg K_2O /ha
 K_2 = 40 kg K_2O /ha

(1) Dans les régions, suffisamment pourvues de K, les deux derniers traitements ($N_2P_2K_1$ $N_2P_2K_2$) peuvent être remplacés par : $N_2P_2K_1$ et $N_2P_1K_1$.

(2) Dans les régions suffisamment pourvues de K, les deux derniers traitements ($P_2N_2K_1$ $P_2N_2K_2$) peuvent être remplacés par $P_2N_2K_1$ et $P_2N_1K_1$.

I/- Si N fait défaut dans une région particulière on utilisera les types I et II.

2/- Si P fait défaut, on utilisera alors les types I et III pour voir comment se comportent les différentes doses d'engrais phosphatés.

Les champs (4 ou 5) seront choisis au hasard dans un cercle d'un kilometre de rayon. Et de ces 4 ou 5 champs on tire au sort pour obtenir un champ d'essai. Dans ce champ d'essai ainsi établi, les divers traitements d'engrais sont aussi distribués au hasard.

 ! K ! NP ! N ! O ! PK ! **P** ! NPK ! NK ! (exemple)

ou

 ! N ! O ! P ! NK !
 ----- (exemple)
 ! NPK ! K ! NP ! PK !

C.- Les champs d'essai pour les nouvelles régions sont les memes que ceux de l'année dernière c'est-à-dire qu'ils ont O, N, NP, NPK, (Paracelles) avec la seule difference que cette fois-ci P paracelles sera appliquée avec la meme dose de N que celle dans NP. De cette façon on peut comparer plus effecti-
 vement les deux formes de phosphates.

En outre les traitements seront distribués au hasard c'est-à-dire

 ! N ! NP ! O ! NPK ! Para-!
 ! ! ! ! ! cel- ! (exemple)
 ! ! ! ! ! les. !

D.- Pour les zones à double repiquage, au lieu de répandre les engrais sous formes de poudre, on les mélangera avec du sol pour former des boulettes. Ces dernières une fois jetées, auront

vite fait d'atteindre la surface du sol et on peut ainsi réduire au minimum les pertes d'engrais causées par la dilution. Dans les régions où la pH est 7 ou au-dessus, il faut remplacer le phosphate tricalcique par le superphosphate car à cette pH le phosphate tricalcique devient insoluble.

Les traitements seront distribués comme suit :

!	!	!	!	!					
!	P	!	O	!	NPK	!	NP	!	(exemple)
!		!		!		!		!	

E.- Une ou deux expériences complexes sur le temps d'application de N seront établies dans les stations rizicoles de province avec les formules suivantes :

- 1.- O (contrôle)
- 2.- PK
- 3.- NPK avec N appliquée le tout avant le repiquage.
- 4.- NPK avec N appliquée le tout 20 jours après repiquage.
- 5.- NPK avec N appliquée le tout avant la floraison.
- 6.- NPK avec 1/2 N appliquée avant repiquage et 1/2 N appliquée avant floraison.
- 7.- NPK avec 1/3 N appliquée avant repiquage et 2/3 N appliquée avant floraison.

Les doses de N, P, K seront :

N.....	30 kg /ha
P ₂ O ₅	30 kg /ha
K ₂ O	30 kg/ha

Ces différentes formules seront répétées 4 ou 5 fois. Après une période (2 ou 3 ans) d'experimentation, on pourra dire avec assurance tel ou tel temps est le plus avantageux pour appliquer l'azote au riz.

F. - De la même façon, on pourra aussi prévoir quelques expériences complexes sur les différentes formes d'engrais azotés.

- I.- O
- 2.- PK
- 3.- PK + $(\text{NH}_4)_2 \text{SO}_4$
- 4.- PK + CO $(\text{NH}_2)_2$
- 5.- PK + CaCN_2
- 6.- PK + Nitramoncal.
(en trois répétitions)

Les Autrichiens (compagnie privée d'engrais chimiques) expriment leur bonne intention de coopérer avec nous sur ce point. Nous proposons 3 expériences, une à Mytho (Station) une à Cai-Lay et une à Soc-Trang.

G.- Si N, P, K ont été donnés en quantités suffisantes et qu'on n'obtienne pas de courbe de réaction, alors les oligo-éléments pourraient être manquants. On devrait donc les étudier plus en détail.

II.- Expériences d'engrais sur les cultures autres que le Riz.

A.- Pour la canne à sucre, le maïs, la ramie, le kenaf, le thé et les légumes, les formules d'engrais sont les suivantes (avec bien entendu, des doses différentes) :

Type I : O, N₁, N₂, N₁P₁, N₁P₂, N₁P₁K₁

Type II : O, N₁, N₂, N₂P₁, N₂P₂, N₂P₂K₂

I/- Pour chaque région et/ou chaque culture on va établir au moins 6 champs d'essai dont 3 du type I et 3 du type II.

2/- La surface du champ d'essai dépendra de la surface disponible du lieu même.

3/- Dose d'engrais pour la canne à sucre :

N ₁	=	40 kg N/ha
N ₂	=	80 kg N/ha
P ₁	=	30 kg P ₂ O ₅ /ha
P ₂	=	60 kg P ₂ O ₅ /ha
K ₁	=	40 kg K ₂ O/ha
K ₂	=	80 kg K ₂ O/ha.

4/- Dose d'engrais pour le maïs, la ramie, le kenaf :

N_1	=	20 kg N/ha	H_1	N_2	:	40	80
N_2	=	40 kg N/ha	P_1	P_2	:	20	40
P_1	=	20 kg P_2O_5 /ha	K_1	K_2	:	20	40
P_2	=	40 kg P_2O_5 /ha					
K_1	=	20 kg I_2O /ha					
K_2	=	40 kg K_2O /ha					

Le Kenaf aura $N_1 = 40$ kg N/Ha, $N_2 = 80$ kg N/Ha. Le reste sera le même que ci-dessus.

5/- Dose d'engrais pour le thé. (À consulter les experts sur le thé à Blao).

6/- Doses d'engrais pour les légumes : À établir d'après les résultats obtenus dans la pratique.

B.- Pour le poivrier. Les champs d'essai auront 4 traitements O, N, NP, NPK (au moins 6 champs d'essai).

III.- Expériences sur le chaulage.

Le programme comporte :

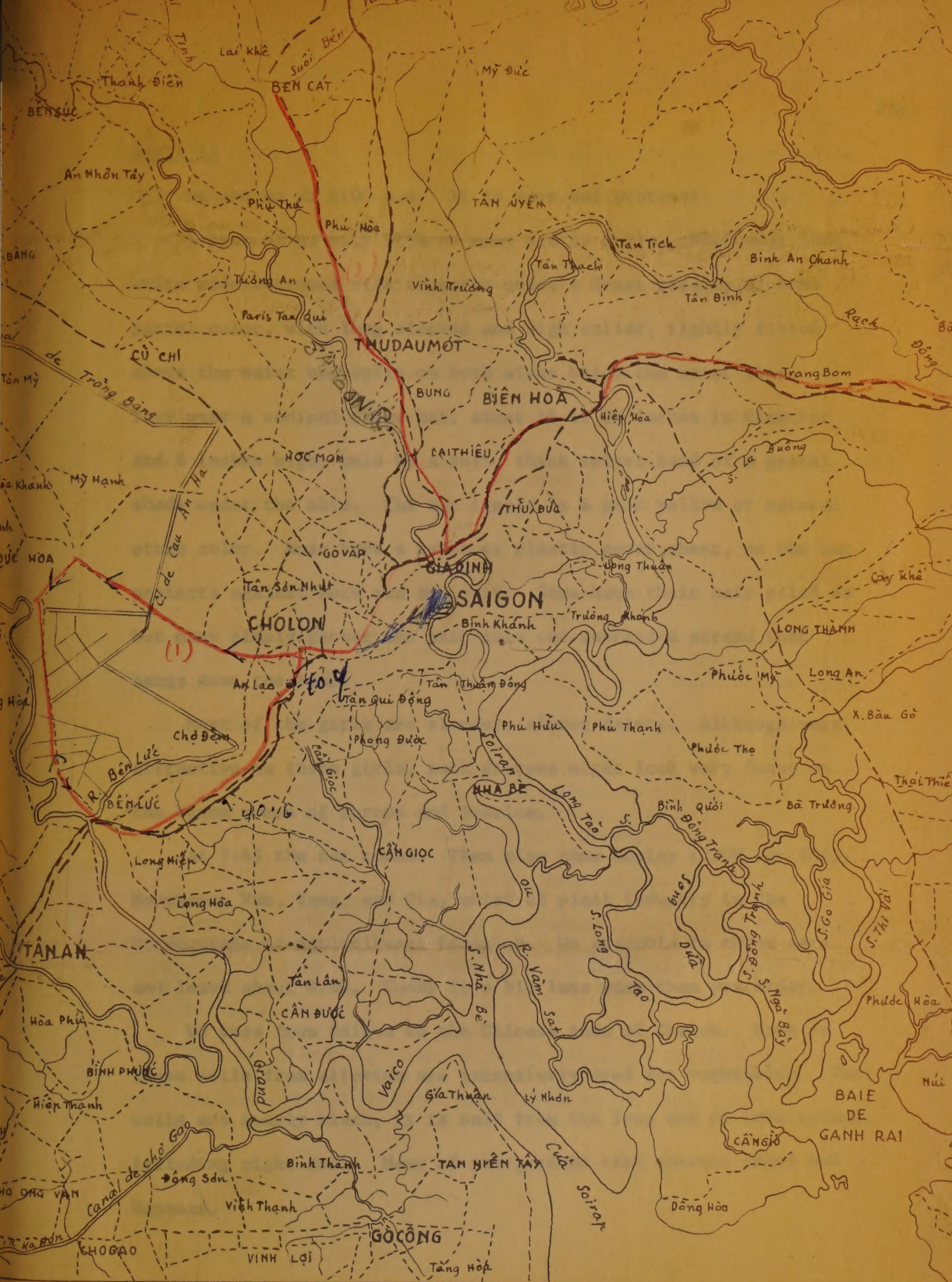
I/- Détermination exacte au laboratoire des besoins de chaux des terres acides.

2/- Expériences en pots avec des sols à différentes pH.

3/- Quelques champs d'essai, d'après une formule à déterminer ultérieurement.

Programme mis au point par Monsieur
BUI-HUU-TRI en collaboration avec Docteur IGNATIET
et Docteur HUKARJEE experts pédologues de la F.A.O.





April 11

We are up at 6:00 a.m. It is warm but overcast.

I know of no city with so many pretty girls. Most wear long, white wide-bottomed silk trousers under a dress usually of some pastel color, with long sleeves and high collar, tightly fitted above the waist but split on both sides below the waist line. They wear a conical straw hat, about 18 to 20 inches in diameter and 6 inches high, held by a soft, thick velvet band of a pastel shade under the chin. The hat itself is a pale yellow or natural straw color. Most have a nylon or plastic cover sheet, so the hat protects against both sun and rain. Some have their hair piled up but many simply gather the hair into one unbraided strand that hangs down the back.

Most of the girls are slender, almost dainty. Although very attractive on these girls, such dresses might look very funny on the buxom women of Europe and America.

At 7:45 the car comes. Then also come Copley (USOM, or ICA), Moormann, Van, Vang, and Gia, chief of plant industry in the Directorate of Agricultural Research. We assemble in three cars and leave about 8:04. Today is a bit less warm than yesterday.

We pass from Saigon to the Chinese town of Cholon. Some of these soils from alluvium are intensively used for vegetables. The soils are nearly black, it is said from the long use of town refuse, including night soil. Many of the gardens have coconut palms and bananas.

April 11

We are up at 6:00 a.m. It is warm but overcast.

I know of no city with so many pretty girls. Most wear long, white wide-bottomed silk trousers under a dress usually of some pastel color, with long sleeves and high collar, tightly fitted above the waist but split on both sides below the waist line.

They wear a conical straw hat, about 18 to 20 inches in diameter and 6 inches high, held by a soft, thick velvet band of a pastel shade under the chin. The hat itself is a pale yellow or natural straw color. Most have a nylon or plastic cover sheet, so the hat protects against both sun and rain. Some have their hair piled up but many simply gather the hair into one unbraided strand that hangs down the back.

Most of the girls are slender, almost dainty. Although very attractive on these girls, such dresses might look very funny on the buxom women of Europe and America.

At 7:45 the car comes. Then also come Gopley (USOM, or ICA), Moormann, Van, Vang, and Gia, chief of plant industry in the Directorate of Agricultural Research. We assemble in three cars and leave about 8:04. Today is a bit less warm than yesterday.

We pass from Saigon to the Chinese town of Cholon. Some of these soils from alluvium are intensively used for vegetables. The soils are nearly black, it is said from the long use of town refuse, including night soil. Many of the gardens have coconut palms and bananas.

We then pass a banded area of grayish soil from fairly recent alluvium over old terrace. I'm told that rice here averages 1 to 1-1/2 metric tons per hectare in one crop. In lower areas where two crops may be had, the annual yield is about 2 tons up to 2-1/2 tons.

About 12 miles southwest of Saigon, we stop to look at a soil fairly long under paddy from a two-story clayey alluvial deposit. This is called the Tieu Can series - transitional to cat⁺ clay. (K-2982) The pH is about 4.0 to 4.5 throughout.

I	A _p	0 - 14"	Dark gray, mottled with yellowish-red, especially near old roots, heavy clay; massive and cracked.
	G	14 - 26"	Light gray heavy clay mottled with yellowish-red and dark brown; massive and cracked; some evidence of cat clay.
II	A _{1b}	26 - 36"	Very dark gray clay, mottled with yellowish-red; massive with fairly wide cracks.
	C	36 - 50+"	Gray clay, soft and sticky when wet, massive and hard when dry, strongly mottled with strong brown (7.5YR 5/6), especially along small channels and in streaks. Good evidence of cat clay.

The soil is massive in place throughout. It dries into very hard, irregular, angular masses. There are somewhat more vertical cracks than horizontal ones.

This is an old cat clay, at least the lower profile, now fairly well regenerated and produces an average annual rice crop.

We then pass a banded area of grayish soil from fairly recent alluvium over old terraces. I'm told that rice here averages 1 to 1-1/2 metric tons per hectare in one crop. In lower areas where two crops may be had, the annual yield is about 2 tons up to

2-1/2 tons. About 12 miles southwest of Saigon, we stop to look at a soil

fairly long under paddy from a two-story clayey alluvial deposit. This is called the Tien Can series - transitional to clay clay. (K-2982)

The pH is about 4.0 to 4.5 throughout.

I A_p 0 - 14" Dark gray, mottled with yellowish-red, especially near old roots, heavy clay; massive and cracked.

G 14 - 26" Light gray heavy clay mottled with yellowish-red and dark brown; massive and cracked; some evidence of cat clay.

II A_{1p} 26 - 36" Very dark gray clay, mottled with yellowish-red; massive with fairly wide cracks.

C 36 - 50+ Gray clay, soft and sticky when wet, massive and hard when dry, strongly mottled with strong brown (7.5YR 2/6), especially along small channels and in streaks. Good evidence of cat clay.

The soil is massive in place throughout. It dries into very hard,

irregular, angular masses. There are somewhat more vertical cracks

than horizontal ones.

This is an old cat clay, at least the lower profile, now fairly

well regenerated and produces an average annual rice crop.



K-2982. April 11, 1959. Viet Nam. 12 km. southwest of Saigon. Profile of clayey, paddy-alluvial soil with cat clay beneath (Tieu Can series).

K-2882. April 11, 1959. Viet Nam. 12 km. southwest
of Saigon. Profile of clayey, psdg-siluvial
soil with cat clay beneath (Tien Can series).

This soil must be very difficult to cultivate. I am told that they have one or two plowings with a Japanese plow after the rains begin. They normally have two harrowings before transplanting. For this field work they use water buffalo. Commonly two varieties of rice are put out together, an early one and a late one, even though only just one crop is planted.

From place to place along the road ditches are dug, partly to make raised beds for man-made terraces for houses and for planting bananas and trees. (K-2897).

There are a few scattered farms along this road but not many villages. I am told that the people prefer to live in long villages along the rivers and canals. Some are on the old beaches. Here the rivers have only weak natural levees along them because they have already dropped most of their load higher up in the plain. It is said that nearer the sea where the creeks are salty the houses are dispersed. It is said that the holdings here run about 2 hectares, somewhat fragmented. Under the new legislation the ceiling for a single farm is 100 hectares and the owner is supposed to manage it himself; but plantations are excepted.

Again we pass several of these man-made terraces for bananas, palms, and fruit trees, including mangoes. Sometimes they begin as small mounds of clayey clods really pried out of the earth rather than dug. The small palm, tree, or banana is planted in these mounds and then during slack seasons the farmer digs out more soil to make the whole terrace.

Some of
this
is
an

This soil must be very difficult to cultivate. I am told that they have one or two plowings with a Japanese plow after the rains begin. They normally have two harrowings before transplanting. For this field work they use water buffalo. Commonly two varieties of rice are put out together, an early one and a late one, even though only just one crop is planned.

From place to place along the road ditches are dug, partly to make raised beds for man-made terraces for houses and for planting bananas and trees. (K-2897).

There are a few scattered farms along this road but not many villages. I am told that the people prefer to live in long villages along the rivers and canals. Some are on the old beaches. Here the rivers have only weak natural levees along them because they have already dropped most of their load higher up in the plain. It is said that nearer the sea where the creeks are salty the houses are dispersed. It is said that the holdings here run about 2 hectares, somewhat fragmented. Under the new legislation the ceiling for a single farm is 100 hectares and the owner is supposed to manage it himself; but plantations are excepted.

Again we pass several of these man-made terraces for bananas, palms, and fruit trees, including mangoes. Sometimes they begin as small mounds of clayey clods really pried out of the earth rather than dug. The small palm, tree, or banana is planted in these mounds and then during slack seasons the farmer digs out more soil to make the whole terrace.



K-2897. April 11, 1959. Viet Nam. 12 km. southwest of Saigon. Landscape of clayey, paddy-alluvial soil with cat clay beneath. Some bedding for bananas or other fruit.



K-2898. April 11, 1959. Viet Nam. 23 km. southwest of Saigon. Landscape including farmhouse on clayey, paddy-alluvial soil.

K-2897. April 11, 1959. Viet Nam. 12 km. southwest of Saigon. Landscape of clayey, paddy-alluvial soil with cat clay beneath. Some bedding for bananas or other fruit.

K-2898. April 11, 1959. Viet Nam. 23 km. southwest of Saigon. Landscape including farmhouse on clayey, paddy-alluvial soil.

We pass Bing Chanh.

About 23 kilometers southwest of Saigon I look at another level, very clayey soil that has been long under paddy, called the Mytho series. (K-2898; K-2983). This is from clayey alluvium over calcareous sandy marine sediments at about 6 to 8 feet.

A _p	0 - 8"	Gray, mottled with strong brown (7.5YR 5/6) especially along root channels, heavy clay; massive and now widely cracked. The soil breaks out in large hard clods. Gradual boundary.
G	8 - 27"	Gray, heavy, massive, cracked clay; very firm; digs out in large clods; gradual boundary.
G-C	27 - 40+"	Light gray, strongly mottled with brown and dark brown; massive and cracked on surface of pit; sticky, plastic, and soft when wet.

This is said to be typical of the best soils for rice in the delta. Yields run about 2.5 metric tons per hectare in one crop. Yet this soil must be very hard to till even with the big buffalo they have here. Now in the dry season it has wide, deep cracks. Clods of 5 to 25 pounds can be pried out with a bar, but one cannot dig into these with a spade.

Along here the people dig holes and trenches partly for water reservoirs but more to get earth to make slightly higher terraces - say 2 feet or so - for growing bananas, palms, and fruit trees. (K-2899)

One sees the odd white gravestone in paddy fields. The elaborate ones are said to be the graves of wealthy farmers.

Here I see no women laborers in the road construction gangs but I am told that women do such work in the poorer farming areas.

I am told that women do such work in the poorer farming areas.

Here I see no women laborers in the road construction gangs but

ones are said to be the graves of wealthy farmers.

One sees the odd white gravestone in paddy fields. The elaborate

say 2 feet or so - for growing bananas, palms, and fruit trees. (K-2899)

reservoirs but more to get earth to make slightly higher terraces -

Along here the people dig holes and trenches partly for water

these with a spade.

5 to 25 pounds can be pried out with a bar, but one cannot dig into

here. Now in the dry season it has wide, deep cracks. Clods of

soil must be very hard to till even with the big buffalo they have

Yields run about 2.5 metric tons per hectare in one crop. Yet this

This is said to be typical of the best soils for rice in the delta.

of pit; sticky, plastic, and soft when wet.
dark brown; massive and cracked on surface
light gray, strongly mottled with brown and
G-C 27 - 40"

Gray, heavy, massive, cracked clay; very firm;
digs out in large clods; gradual boundary.
G 8 - 27"

boundary.
breaks out in large hard clods. Gradual
massive and now widely cracked. The soil
especially along root channels, heavy clay;
Gray, mottled with strong brown (7.5YR 5/6)
A_p 0 - 8"

carious sandy marine sediments at about 6 to 8 feet.

series. (K-2898; K-2983). This is from clayey alluvium over cal-

very clayey soil that has been long under paddy, called the Mytho

About 23 kilometers southwest of Saigon I look at another level.

We pass Bing Chanh.



K-2983. April 11, 1959. Viet Nam. 23 km. southwest of Saigon.
Profile of clayey, paddy soil from alluvium (Mytho series).

K-2983. April 11, 1959. Viet Nam. 23 km. southwest of Saigon.
Profile of clayey, gaddy soil from alluvium (Mytho series).



K-2899. April 11, 1959. Viet Nam. 23 km. southwest of Saigon. A view of farmhouse here on clayey, paddy-alluvial soil looking across a pit being dug partly for a reservoir and more to get soil for making beds for bananas and fruit.

K-2899. April 11, 1959. Viet Nam. 23 km. southwest of Saigon.
A view of farmhouse here on clayey, paddy-alluvial soil
looking across a pit being dug partly for a reservoir
and more to get soil for making beds for bananas and
fruit.

We pass Ben Luc, turn north, cross a small river and pass over a strip of wettish alluvial soil. This is bordered by a somewhat salty soil that may be over cat clay. It has only rushes on it. Then we come to slightly higher soil somewhat similar to the last profile examined but apparently not quite so productive. As we go north we pass over a soil something like the first profile and then on to soils with more cat clay beneath. A little way to the west I see heavier vegetation, including bananas and sugarcane on the low levees of the Vaico River. These are transitional to cat clay, I am told, and culture begins with pineapples for a few crops and then they go to sugarcane.

Just as we approach the area of extreme cat clay, our primary objective, a messenger comes in a jeep to tell me that I must go at once to visit the President of the Republic at his palace! This is a pity since I would need only an hour here. But the messenger insists that I must see him at 11:00 and it is already nearly 10:30. While my guides debate a little bit I get a photograph and we start back. (K-2900)

I had noticed before policemen in the villages and along the road. I am now told that these are for my protection. They seem like nice enough fellows but I should dislike to depend very much on them. They don't look warlike enough.

Our driver goes very fast and wheels me up to the Palace at just about 11:00. The Minister of Agriculture meets me and takes me into a fine drawing room despite the field clothes and the cat

We pass Ben Luc, turn north, cross a small river and pass over a strip of wetish alluvial soil. This is bordered by a somewhat salty soil that may be over cat clay. It has only rushes on it. Then we come to slightly higher soil somewhat similar to the last profile examined but apparently not quite so productive. As we go north we pass over a soil something like the first profile and then on to soils with more cat clay beneath. A little way to the west I see heavier vegetation, including bananas and sugarcane on the low levees of the Vao River. These are transitional to cat clay, I am told, and culture begins with pineapples for a few crops and then they go to sugarcane.

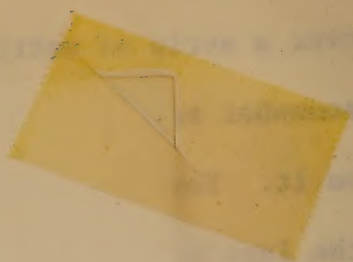
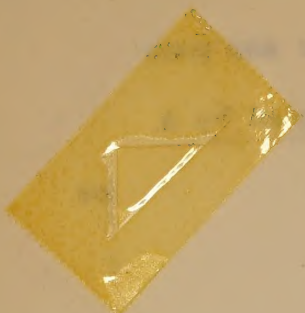
Just as we approach the area of extreme cat clay, our primary objective, a messenger comes in a jeep to tell me that I must go at once to visit the President of the Republic at his palace! This is a pity since I would need only an hour here. But the messenger insists that I must see him at 11:00 and it is already nearly 10:30. While my guides debate a little bit I get a photograph and we start back. (K-2900)

I had noticed before policemen in the villages and along the road. I am now told that these are for my protection. They seem like nice enough fellows but I should dislike to depend very much on them. They don't look warlike enough.

Our driver goes very fast and wheels me up to the Palace at just about 11:00. The Minister of Agriculture meets me and takes me into a fine drawing room despite the field clothes and the cat



K-2900. April 11, 1959. Viet Nam. About 3 km. northwest of Ben Luc. From the transition to cat clay looking toward the levee of the Vaico River.



K-2900. April 11, 1959. Viet Nam. About 3 km. northwest of Ben Luc. From the transition to red clay looking toward the levee of the Valsco River.

Back. (C-1900)

clay on my shoes. Then Mr. Wolfe Ladejinsky comes in and we chat for a moment. In 2 or 3 minutes comes the President, Mr. Ngo Dinh Diem, with an interpreter. The President understands English but prefers to speak in French. (I try to speak slowly and I think he understands everything except some of the technical terms that cannot be avoided.) He leads the conversation; the others say very little.

Immediately we speak of the big area of cat clay in the Plaine des Joncs (equals "Plain of the Rushes"). He speaks of the varying tides and rainy seasons and how some parts receive water before others. I try to explain to him how these cat clays form and how they result from soil evolution after a long period of salty water with rank vegetation; and that the current tides have really little to do with the formation of the old soils. I explain how the level of the sea went up and down several times during the glacial period and how the courses of the many rivers and creeks within the delta have changed many times. Although a deltaic plain may appear smooth and uniform on the surface, actually it is very irregular beneath. I think that the President would like to have a word of encouragement about these cat clays. He says that they must build a canal for transport. (I think he wants to dig the canal in order to have a grade for a military road to the frontier of Cambodia.) I explain that we don't know just where the line comes between those that can be used and those that cannot; but that I know of no practical way for economic development of the extreme cat clays.

clay on my shoes. Then Mr. Wolfe Jadesjinsky comes in and we chat for a moment. In 2 or 3 minutes comes the President, Mr. Ngo Dinh Diem, with an interpreter. The President understands English but prefers to speak in French. (I try to speak slowly and I think he understands everything except some of the technical terms that cannot be avoided.) He leads the conversation; the others say very little.

Immediately we speak of the big area of cat clay in the Plaine des Jones (equals "Plain of the Rushes"). He speaks of the varying tides and rainy seasons and how some parts receive water before others. I try to explain to him how these cat clays form and how they result from soil evolution after a long period of salty water with rank vegetation; and that the current tides have really little to do with the formation of the old soils. I explain how the level of the sea went up and down several times during the glacial period and how the courses of the many rivers and creeks within the delta have changed many times. Although a deltaic plain may appear smooth and uniform on the surface, actually it is very irregular beneath. I think that the President would like to have a word of encouragement about these cat clays. He says that they must build a canal for transport. (I think he wants to dig the canal in order to have a grade for a military road to the frontier of Cambodia.) I explain that we don't know just where the line comes between those that can be used and those that cannot; but that I know of no practical way for economic development of the extreme cat clays.

He then speaks of the highlands back from the sea. (From what Moormann has told me these must be Reddish-Brown Latosols.) We speak of maize, fiber crops, cashewnuts, and so on. He insists that he wants me to see this area. I tell him that I am at his service. The decision is made at once that I will be picked up at the hotel at 6:00 a.m. tomorrow for the plane trip and that Moormann and Ladejinsky are to go with me. I am warned that the roads are now very dry and dusty.

I take my leave of the President and Minister and return to the hotel for lunch. We work in our room for awhile on notes and then prepare to go back to the cat clays.

We leave the hotel at 2:30 to return to the area of cat clay, this time by the road to Duc Hoa. It has now become sunny and very warm. After we leave the city we go northwest on soils from an old terrace. I see some rather poor patches of paddy and some poor mixed cultures. I suspect that the edge of this old terrace was an ocean beach because some of the soils are quite sandy.

We stop and go out into the field on the low side of the terrace to look at mushroom growing. (K-2901; K-2902) This is a curious enterprise. Little bundles of rather coarse rice straw, about 1 foot long and 5 inches in diameter, are piled into ridges around 15 to 20 feet long and about 18 inches high. This material is partially composted. On this material mushrooms are grown under covers of fresh uncomposted rice straw. Water is obtained from shallow charas wells with small leathern buckets and led out to the ridges in little furrows. I can

He then speaks of the highlands back from the sea. (From what Moormann has told me these must be Reddish-Brown Latosols.) We speak of maize, fiber crops, cashewnuts, and so on. He insists that he wants me to see this area. I tell him that I am at his service. The decision is made at once that I will be picked up at the hotel at 6:00 a.m. tomorrow for the plane trip and that Moormann and Ladejinsky are to go with me. I am warned that the roads are now very dry and dusty.

I take my leave of the President and Minister and return to the hotel for lunch. We work in our room for awhile on notes and then prepare to go back to the cat clays. We leave the hotel at 2:30 to return to the area of cat clay, this time by the road to Duc Hoa. It has now become sunny and very warm. After we leave the city we go northwest on soils from an old terrace. I see some rather poor patches of paddy and some poor mixed cultures. I suspect that the edge of this old terrace was an ocean beach because some of the soils are quite sandy.

We stop and go out into the field on the low side of the terrace to look at mushroom growing. (K-2901; K-2902) This is a curious enterprise. Little bundles of rather coarse rice straw, about 1 foot long and 5 inches in diameter, are piled into ridges around 15 to 20 feet long and about 18 inches high. This material is partially composted. On this material mushrooms are grown under covers of fresh uncomposted rice straw. Water is obtained from shallow charas wells with small leather buckets and led out to the ridges in little furrows. I can



K-2901. April 11, 1959. Viet Nam. 12 km. southwest of Saigon. A mushroom farm. The mushrooms are grown on the dark-colored, partially composted ridges of rice straw and covered with fresh rice straw.



K-2902. April 11, 1959. Viet Nam. 12 km. southwest of Saigon. Another view of a mushroom farm. The mushrooms are grown on the dark colored, partially composted ridges of rice straw and covered with fresh rice straw.

see from the wells that there is laterite beneath so that the soil here is developed from alluvium and local alluvium over the laterite of the old terrace.

We drive on along the old terrace. I see some more mushroom farms and paddy fields on the lower level with at least the upper part of the soils of more recent alluvium.

The buffalo here are bigger and stronger than those in India. Most of them are quite sleek and in good flesh.

Then we come into a poor paddy area on moderately developed cat clay. I see no houses here where the soils are acid. As we go on, the soils become worse. There are no field bunds and the yields are said to be about 700 kilograms per hectare.

I am amazed to find that pineapples can be grown on these bedded cat clays. They certainly are not very good pineapples. Yields are low and the fruit is not suitable for canning. But still so many people grow them that they are very cheap in the market. The leaves seem to be discolored and unhealthy. Dr. Moormann thinks that this may be green dieback resulting from copper deficiency.

Within this bad area we pass through a poor village of Catholic refugees from the north. They have built their houses on narrow man-made terraces of material dug out of the canals. They are said to be hard-working people. They grow some pineapples and do wood cutting back on the soils of the old terrace. I go into one of the homes where they are spinning and weaving cotton textiles.

I am told that there is some possibility for forest trees here on this acid soil, a tree called "tram." I also see quite a few ducks.

see from the wells that there is laterite beneath so that the soil here is developed from alluvium and local alluvium over the laterite of the old terrace.

We drive on along the old terrace. I see some more mushroom farms and paddy fields on the lower level with at least the upper part of the soils of more recent alluvium.

The buffalo here are bigger and stronger than those in India.

Most of them are quite sleek and in good flesh.

Then we come into a poor paddy area on moderately developed

cat clay. I see no houses here where the soils are acid. As we go on, the soils become worse. There are no field bunds and the

yields are said to be about 700 kilograms per hectare.

I am amazed to find that pineapples can be grown on these bad

cat clays. They certainly are not very good pineapples. Yields are

low and the fruit is not suitable for canning. But still so many

people grow them that they are very cheap in the market. The leaves

seem to be discolored and unhealthy. Dr. Moormann thinks that this

may be green dieback resulting from copper deficiency.

Within this bad area we pass through a poor village of Catholic

refugees from the north. They have built their houses on narrow

man-made terraces of material dug out of the canals. They are said

to be hard-working people. They grow some pineapples and do wood

cutting back on the soils of the old terrace. I go into one of the

homes where they are spinning and weaving cotton textiles.

I am told that there is some possibility for forest trees here on

this acid soil, a tree called "cram." I also see quite a few ducks.

(Since he cannot answer many questions about farm enterprises, I am beginning to fear that Moormann has kept his eyes a bit too exclusively on the soils and not enough on the agriculture.)

As we drive on we get back on somewhat higher land with gray soil banded for paddy. Then we pass Duc Hoa on a relatively high terrace and drive southwest and south out into the lowland of acid soils of intermediate cat clay where they can get fair crops of paddy provided that it rains enough to keep the soil wet. But a short dry period ruins the crop.

We stop about 3 miles south of Duc Hoa in an extreme cat clay area. The soil is quite rich in organic matter. The wet soil from deep borings is nearly black and has the odor of hydrogen sulphide. It dries to a dark brown in the ditches and is strongly mottled with reddish-yellow and yellowish-gray. The dry upper soil, thrown into the beds is mostly in fragments of low bulk density. These are well coated with the yellowish iron compound characteristic of drained cat clays. In many places there is a white efflorescence that is said to be "alum." On this basis the French call these "alum" soils. They had the incorrect idea that this "alum" had been brought into these lowlands with water from the uplands. Therefore they recommended drainage and leaching! And this, of course, makes matters worse. A farm family living here has pineapples growing on raised beds of this organic-rich cat clay thrown up out of ditches. (K-2903) They have also planted coconuts. The plants do not look well and the sides of the beds show the characteristic yellowish staining.

(Since he cannot answer many questions about farm enterprises,

I am beginning to fear that Moormann has kept his eyes a bit too

exclusively on the soils and not enough on the agriculture.)

As we drive on we get back on somewhat higher land with gray

soil bounded for paddy. Then we pass Duc Hoa on a relatively high

terrace and drive southwest and south out into the lowland of acid

soils of intermediate cat clay where they can get fair crops of

paddy provided that it rains enough to keep the soil wet. But a

short dry period ruins the crop.

We stop about 3 miles south of Duc Hoa in an extreme cat clay

area. The soil is quite rich in organic matter. The wet soil from

deep borings is nearly black and has the odor of hydrogen sulphide.

It dries to a dark brown in the ditches and is strongly mottled with

reddish-yellow and yellowish-gray. The dry upper soil, thrown into

the beds is mostly in fragments of low bulk density. These are well

coated with the yellowish iron compound characteristic of drained

cat clays. In many places there is a white efflorescence that is

said to be "alum." On this basis the French call these "alum" soils.

They had the incorrect idea that this "alum" had been brought into

these lowlands with water from the uplands. Therefore they recommended

drainage and leaching! And this, of course, makes matters worse.

A farm family living here has pineapples growing on raised beds of

this organic-rich cat clay thrown up out of ditches. (K-2903) They

have also planted coconuts. The plants do not look well and the sides

of the beds show the characteristic yellowish staining.



K-2903. April 11, 1959. Viet Nam. 4 km. south of Duc Hoa.
Pineapples on bedded organic-rich cat clay.



K-2984. April 11, 1959. Viet Nam. 4 km. south of Duc Hoa.
Typical rush vegetation on organic-rich cat clay.
(Typical buffalo.)

K-2903. April 11, 1959. Viet Nam. 4 km. south of Duc Hoa.
Pineapples on bedded organic-rich est clay.

K-2904. April 11, 1959. Viet Nam. 4 km. south of Duc Hoa.
Typical rush vegetation on organic-rich est clay.
(Typical buffalo.)

I walk across the road to photograph an untouched area of this organic-rich cat clay with its characteristic rush vegetation. (K-2984).

At about one kilometer east on the levee of the river I see sugarcane, now yellowish, probably from nitrogen deficiency.

We then turn back along the road we came. On the soils of the high terrace quite a few coconuts are grown.

Mr. T. L. Copley is with us on these trips today. I understand he once worked as a management agronomist in the SCS. Now he is here with USOM (ICA) as a specialist on both rice and fertilizers although he has had little or no experience with either. I am told that another American is here with USOM as a sugarcane expert although he had had no previous experience with this crop. This is not unusual for ICA but nevertheless I am still shocked by such things. Some with ICA are good and work hard; but too many are incompetent, lazy, and live higher abroad than they do at home.

On the road back we stop at a small so-called experimental station in an extreme cat clay area. Field tests show the dry soil to be below pH 4; probably it is much below, say around pH 2. They have some poor sugarcane on the bedded soil said to have received 16 tons per hectare of coconut ash. But really these people do not know what they have done. Each plot varies from each other one in two or three treatments.

People here are very courteous and we have to stop for light refreshments - coconut milk, sugarcane juice, fresh cat-clay grown pineapples, and bananas. About 5:10 we start back to Saigon.

I walk across the road to photograph an untouched area of this organic-rich cat clay with its characteristic lush vegetation. (K-2984).

At about one kilometer east on the levee of the river I see

sugarcane, now yellowish, probably from nitrogen deficiency.

We then turn back along the road we came. On the soils of the

high terrace quite a few coconuts are grown.

Mr. T. J. Copley is with us on these trips today. I understand

he once worked as a management agronomist in the SCs. Now he is here

with USOM (ICA) as a specialist on both rice and fertilizers although

he has had little or no experience with either. I am told that

another American is here with USOM as a sugarcane expert although

he had had no previous experience with this crop. This is not

unusual for ICA but nevertheless I am still shocked by such things.

Some with ICA are good and work hard; but too many are incompetent,

lazy, and live higher abroad than they do at home.

On the road back we stop at a small so-called experimental station

in an extreme cat clay area. Field tests show the dry soil to be

below pH 4; probably it is much below, say around pH 2. They have

some poor sugarcane on the bedded soil said to have received 16 tons

per hectare of coconut ash. But really these people do not know

what they have done. Each plot varies from each other one in two

or three treatments.

People here are very courteous and we have to stop for light

refreshments - coconut milk, sugarcane juice, fresh cat-clay grown

pineapples, and bananas. About 5:10 we start back to Saigon.

We return to our hotel room, bathe, work on notes for awhile, and then go to dinner. Just as we start dinner, Dr. Moormann brings us a typewriter and my brown suit coat neatly repaired.

Then a little work on notes and to bed.

We return to our hotel room, bathe, work on notes for awhile, and then go to dinner. Just as we start dinner, Dr. Moormann brings us a typewriter and my brown suit coat neatly repaired.

Then a little work on notes and to bed.

My room is very comfortable, and the bed is very good.

The food is very good, and the service is excellent.

High latitude birds are everywhere.

Mr. J. L. Gifford is with us on these trips today. I understand

he was working as a management agent in the U.S. Now he is here

with some (1904) as a specialist on bird life and distribution all over

the world. He is very interested in the birds of the Arctic.

Another American is here with him as a regular expert on birds.

He has had no previous experience with this work. This is his

first time. For his first experience I am still shocked by such things.

Both of them are good and very hard; but the work is interesting.

They are the highest things that they do at home.

On the road back we stop at a small one-sided settlement and the

in the morning we start again. There is a small one-sided settlement

below it; probably it is much better, say around it. They have

some good specimens in the museum and to have received in some

particular of recent date. But usually these people do not know

what they have done. They also collect from each other and in some

of these specimens.

People here are very poor and we have to sleep for days

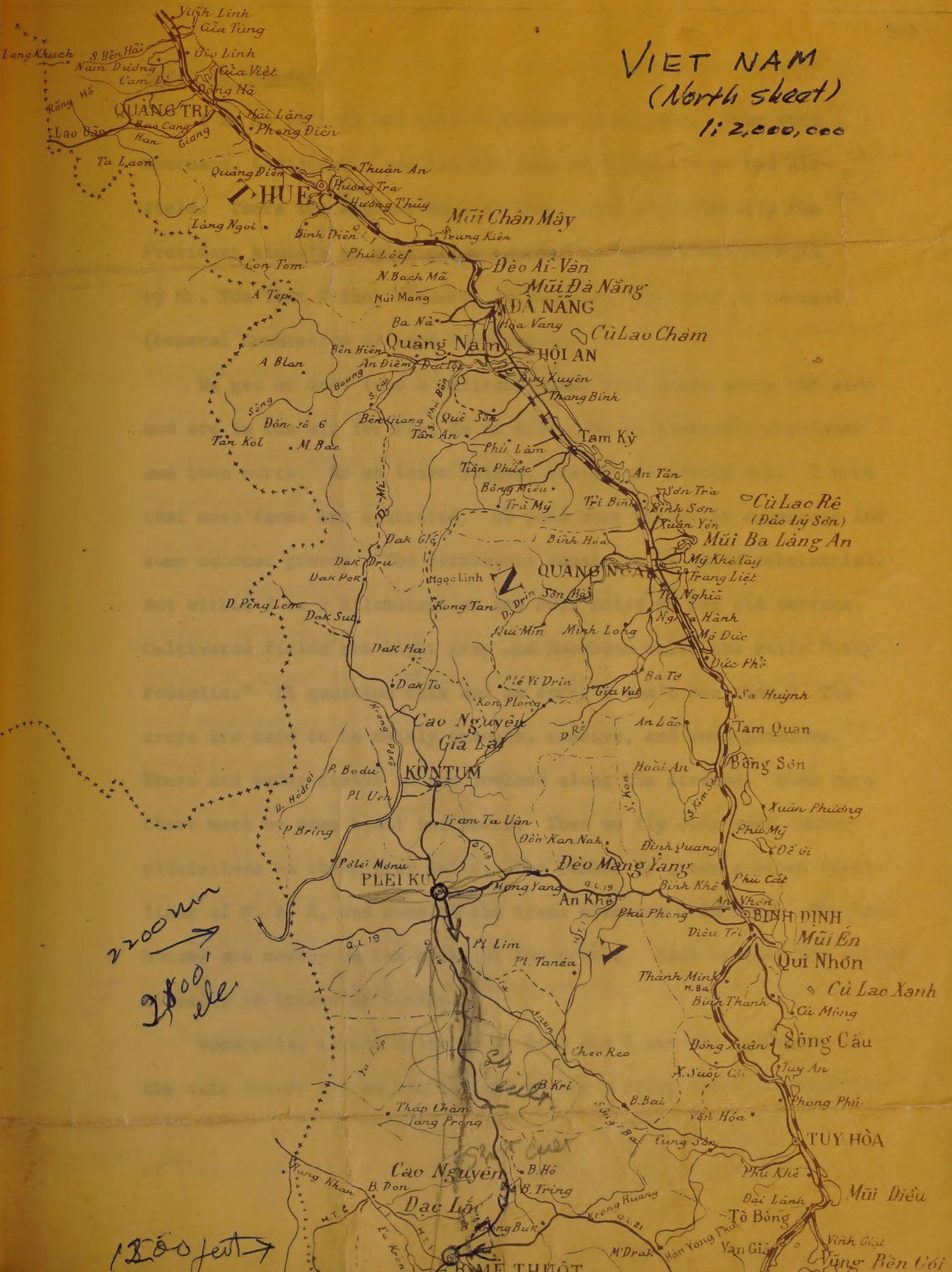
without any food. They are very poor, and they are very poor.

They are very poor, and they are very poor. They are very poor, and they are very poor.

DU SUD VIET-NAM

VIET NAM
(North sheet)

1:2,000,000

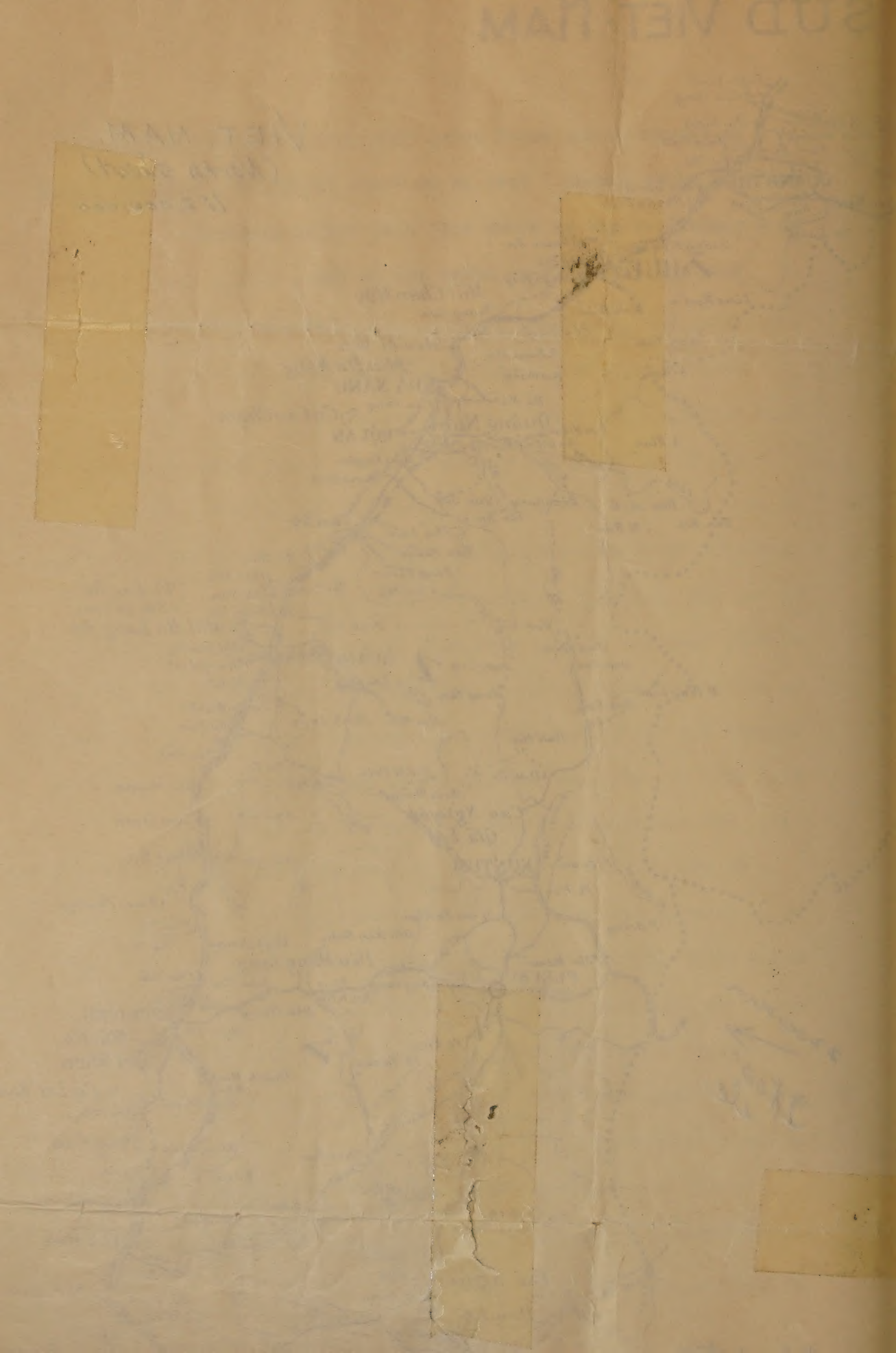
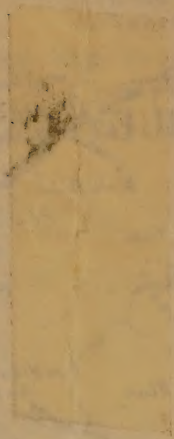


OLD NEW HAM

VICT. NAME

(NO. 10 2000)

125-000000



April 12 (Sunday)

I am up at 5:15 and have breakfast in my room. Then with Moormann, Ladijinski, and Lan Van Vang we drive out to the air-field. There are a great many soldiers here so apparently the President himself is also going somewhere. We are accompanied by Mr. Ton That Trinh, Director of Technical Services in Comigal (General Commission of Land Development).

We get at once into a military plane with seats along the side and are in the air for Plei Ku at 6:33. We go generally northeast and then north. As we leave Saigon, fields are mostly dry. I note that most farms are scattered. We pass over irrigated sugarcane and some coconut groves. The farmhouses appear to be quite substantial. But within 7 to 9 kilometers we are over soils of the old terrace. Cultivated fields are light gray and Moormann calls the soils "Gray Podzolic." (I question this and am sorry I won't see them.) The crops are said to be mainly peanuts, cassava, and sweetpotatoes. There are paddy fields in the lowland along the streams. Even here there must be some tidal influence. Then we fly over some rubber plantations on these gray soils. The rubber is given a mixed fertilizer of N, P, K, and some of the trace elements I am told. The farm houses are mostly on the banks of the creeks. Back of them are strips of paddy in irregular fields.

Unhappily, clouds drift in at 6:45 and I get only glimpses of the rain forest (?) on the lowland we are passing over. Through the

April 12 (Sunday)

I am up at 5:15 and have breakfast in my room. Then with Moormann, Ladjinski, and Lan Van Vang we drive out to the airfield. There are a great many soldiers here so apparently the President himself is also going somewhere. We are accompanied by Mr. Ton That Trinh, Director of Technical Services in Comigal (General Commission of Land Development).

We get at once into a military plane with seats along the side and are in the air for Pliet Ke at 6:33. We go generally northeast and then north. As we leave Saigon, fields are mostly dry. I note that most farms are scattered. We pass over irrigated sugarcane and some coconut groves. The farmhouses appear to be quite substantial. But within 7 to 9 kilometers we are over soils of the old terrace. Cultivated fields are light gray and Moormann calls the soils "Gray Podzolic." (I question this and am sorry I won't see them.) The crops are said to be mainly peanuts, cassava, and sweetpotatoes. There are paddy fields in the lowland along the streams. Even here there must be some tidal influence. Then we fly over some rubber plantations on these gray soils. The rubber is given a mixed fertilizer of N, P, K, and some of the trace elements I am told. The farm houses are mostly on the banks of the creeks. Back of them are strips of paddy in irregular fields.

Unhappily, clouds drift in at 6:45 and I get only glimpses of the rain forest (?) on the lowland we are passing over. Through the

clouds I see a natural pattern of dark and light green suggesting mixed forest and savanna, probably on poor soil (perhaps shallow over basalt). The area has almost no roads and very few inhabitants.

What a pity we have these clouds. I am told that in the flooded lowlands of alluvium from basalt they have had good success with "floating" rice even up to 1,200 feet elevation.

I am told that the government is trying to intersperse villages of Vietnamese settlers from the lowlands with villages of the tribal people of the plateaus and mountains. The mountain people learn how to grow rice and the plains people learn how to use the upland forests. The mountain people here are called the Ma-Koglai and the Chami, and are said to be remnants of tribes formerly on the lowlands.

Out about 225 kilometers I get glimpses through the haze of what appears to be solid forest with thin places, perhaps of savanna after fire. At about 250 kilometers we are over mostly savanna with some thin woodland on undulating terrain. Moormann says these are "Gray Podzolic" soils. Here I see essentially no shifting cultivation (called "ray" in Viet Nam). I see some depressions, which appear lighter in color from the plane, that are said to be heavy clay. The trees of the woodland are called "dau" (Dipterocarpaceae), which are said to take the place of the Meliaceae of Africa. The grasses belong in the family of Andropogonae, and the most frequent species is Heteropogon contortus.

Around 300 kilometers we pass over somewhat redder soils with thin forest. I see a few ponds and some evidence, here and there, of fields, but very few. Where the little ponds have dried out now

of fields, but very few. Where the little ponds have dried out now
 thin forest. I see a few ponds and some evidence, here and there,
 Around 300 kilometers we pass over somewhat redder soils with
is *Heteropogon contortus*.
 belong in the family of *Andropogonaceae*, and the most frequent species
 are said to take the place of the *Melissae* of Africa. The grasses
 The trees of the woodland are called "dau" (*Dipterocarpaceae*), which
 lighter in color from the plane, that are said to be heavy clay.
 (called "ray" in Viet Nam). I see some depressions, which appear
 thin woodland on undulating terrain. Moormann says these are "Gray
 fire. At about 250 kilometers we are over mostly savanna with some
 appears to be solid forest with thin places, perhaps of savanna after
 Out about 225 kilometers I get glimpses through the haze of what
 are said to be remnants of tribes formerly on the lowlands.
 The mountain people here are called the Ma-Koglai and the Cham, and
 to grow rice and the plains people learn how to use the upland forests.
 people of the plateaus and mountains. The mountain people learn how
 of Vietnamese settlers from the lowlands with villages of the tribal
 I am told that the government is trying to intersperse villages
 "floating" rice even up to 1,200 feet elevation.
 lowlands of alluvium from basalt they have had good success with
 What a pity we have these clouds. I am told that in the flooded
 over basalt). The area has almost no roads and very few inhabitants.
 mixed forest and savanna, probably on poor soil (perhaps shallow
 clouds I see a natural pattern of dark and light green suggesting

at the end of the dry season light gray spots appear. We are said to be still mainly on the gray soils but I see a few spots of shifting cultivation.

At about 315 kilometers the relief is stronger and the forest is better. There is evidence of old shifting cultivation but very few new fields. Then in another 20 kilometers the forest is still better. Apparently we are over rolling soil from basalt with fairly sharp slopes. Most of the land is in some stage of shifting cultivation; in fact there are so many cleared fields that the cycle must be a bit too short even for Reddish-Brown Latosol, which is what I suspect the soil may be. Some of the fields in favored place must be nearly permanent.

At about 360 kilometers we pass over a large tea plantation on reddish soils from basalt. I see no shade trees.

Then we prepare to land. As we come down I see good forest only on the short steep slopes of the ravines. Most of the land has short savanna, no doubt due to overcropping, invasion of grasses, and repeated fire in the dry season. Near ponds and streams I see banded fields, probably for paddy.

For some reason the pilot does not land and we circle. He has obviously lost his way; but he soon finds it again. He circles and comes down at the airfield by Plei Ku at 8:15. The elevation is said to be 2,100 feet here and the rainfall about 66 inches. It comes from May to November. But the soil is very dry during December, January, February, and March.

at the end of the dry season light gray spots appear. We are said to be still mainly on the gray soils but I see a few spots of shifting cultivation.

At about 315 kilometers the relief is stronger and the forest is better. There is evidence of old shifting cultivation but very few new fields. Then in another 20 kilometers the forest is still better. Apparently we are over rolling soil from basalt with fairly sharp slopes. Most of the land is in some stage of shifting cultivation; in fact there are so many cleared fields that the cycle must be a bit too short even for Reddish-Brown Latosol, which is what I suspect the soil may be. Some of the fields in favored place must be nearly permanent.

At about 360 kilometers we pass over a large tea plantation on reddish soils from basalt. I see no shade trees. Then we prepare to land. As we come down I see good forest only on the short steep slopes of the ravines. Most of the land has short savanna, no doubt due to overcropping, invasion of grasses, and repeated fire in the dry season. Near ponds and streams I see banded fields, probably for paddy.

For some reason the pilot does not land and we circle. He has obviously lost his way; but he soon finds it again. He circles and comes down at the airfield by Plet Ku at 8:15. The elevation is said to be 2,100 feet here and the rainfall about 66 inches. It comes from May to November. But the soil is very dry during December, January, February, and March.

Apparently the President is expected here because there are a great many soldiers and military vehicles. It is hard to imagine this large an honor guard for us. We are met by the Chief of Province, the military commander, and many other officials.

We get into a diesel land-rover and ride east on a poor, dusty, very red road. The soil is undulating to strongly rolling. I see stakes set and a grade begun for a new road, which is said to be financed by the Americans. It will give a good outlet to the sea near Binh Dinh.

It is said to be necessary to have settlements and roads here for security reasons. The Communist partisans of North Viet Nam had hoped to cut the central road. As we drive along there are soldiers at each road crossing. In the deep cuts of the uplands, the red soils have a weak, very coarse, prismatic structure. In the low places the soils are nearly black but seem hardly heavy enough or cracked enough for Tropical Black Clays.

We pass some villages laid out on the square by the military. This is poor planning and the newer ones on the contour are much better. In a little valley where there is water, I see many small terraced fields for rice and vegetables.

Dr. Moormann tells me that these settlements are not quite voluntary. Some of the poorer people from the coastal region have been made to move into them.

At about 25 kilometers we come to a kind of headquarters in the new village of LeCan. Here there is a small guard of honor of soldiers and a very large group of settlers lined up. Immediately

Apparently the President is expected here because there are a great many soldiers and military vehicles. It is hard to imagine this large an honor guard for us. We are met by the Chief of Province, the military commander, and many other officials.

We get into a diesel land-rover and ride east on a poor, dusty, very red road. The soil is undulating to strongly rolling. I see stakes set and a grade begun for a new road, which is said to be financed by the Americans. It will give a good outlet to the sea near Binh Dinh.

It is said to be necessary to have settlements and roads here for security reasons. The Communist partisans of North Viet Nam had hoped to cut the central road. As we drive along there are soldiers at each road crossing. In the deep cuts of the uplands, the red soils have a weak, very coarse, prismatic structure. In the low places the soils are nearly black but seem hardly heavy enough or cracked enough for Tropical Black Clays.

We pass some villages laid out on the square by the military. This is poor planning and the newer ones on the contour are much better. In a little valley where there is water, I see many small terraced fields for rice and vegetables.

Dr. Moormann tells me that these settlements are not quite voluntary. Some of the poorer people from the coastal region have been made to move into them.

At about 25 kilometers we come to a kind of headquarters in the new village of IeGan. Here there is a small guard of honor of soldiers and a very large group of settlers lined up. Immediately

after I get out of the car I am told that I must give them a speech about good farming here! (K-2904). If ever anyone had a captive audience I have one now. Perhaps the translator dresses it up a bit.

After animated conversation in French we get into the cars again at 9:20. I am told that last year the kenaf did very well so that the settlers don't feel so badly about being here.

We start back west toward the town and I am told that we can make a few stops. (K-2985)

I look at the soil in a field and in the adjacent road cutting. Unhappily, we have no proper spade. The surface 8 to 10 inches is a very friable dark red (2.5YR 3/6) clay. The soil beneath is dusky red (10YR 3/4) very friable clay. This soil is friable throughout to very finely granular. Although Dr. Moormann has assumed that these soils have developed in place from basalt I suspect that the material has been moved around. To me they are too friable for Reddish-Brown Latosols. They are very similar to the soils near Bambessa of the northern Congo, which I named Earthy Red Latosol. I am told that the savanna here gets about 3 feet high during the rainy season. Unhappily, I notice that there is some Imperata cylindrica about. There are a few tall trees here and there but between the cutting for fuel and the savanna fires there are not many. (K-2905)

Quite a bit of the land is covered with an exotic shrub - Eupatorium odoratum (Christmasbush), which is said to make good compost. There are a few tall kapoc trees about. These are now

after I get out of the car I am told that I must give them a speech about good farming here! (K-2904). If ever anyone had a captive audience I have one now. Perhaps the translator dresses it up a bit.

After animated conversation in French we get into the cars again at 9:20. I am told that last year the kennel did very well so that the settlers don't feel so badly about being here. We start back west toward the town and I am told that we can make a few stops. (K-2982)

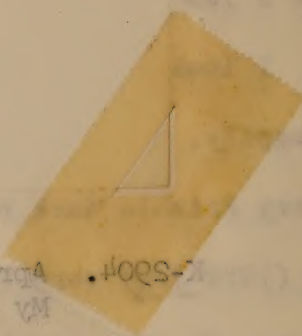
I look at the soil in a field and in the adjacent road cutting. Unhappily, we have no proper spade. The surface 8 to 10 inches is a very friable dark red (2.5YR 3/6) clay. The soil beneath is dusky red (10YR 3/4) very friable clay. This soil is friable throughout to very finely granular. Although Dr. Moorman has assumed that these soils have developed in place from basalt I suspect that the material has been moved around. To me they are too friable for Reddish-Brown Latosols. They are very similar to the soils near Bambeasa of the northern Congo, which I named Harty Red Latosol. I am told that the savanna here gets about 3 feet high during the rainy season. Unhappily, I notice that there is some Imperata cylindrica about. There are a few tall trees here and there but between the cutting for fuel and the savanna fires there are not

many. (K-2902) Quite a bit of the land is covered with an exotic shrub - Eupatorium odoratum (Christmasbush), which is said to make good compost. There are a few tall kapoc trees about. These are now



K-2904. April 12, 1959. Viet Nam. 25 km. east of Plei Ku.
My captive audience at the village of LeCan.

K-2985. April 12, 1959. Viet Nam. 25 km. east of Plei Ku.
Farm home and new field on Earthy Red Latosol.



Top (K-2901). April 12, 1959. Viet Nam. 25 km. east of Hoi An.
My captive audience at the village of Le Cam.



K-2985. April 12, 1959. Viet Nam. 25 km. east of Plei Ku.
Farm home and new field on Earthy Red Latosol.



K-2905. April 12, 1959. Viet Nam. 24 km. east of Plei Ku.
View of Earthy Red Latosol before clearing for
farms. Some low trees have been cut for fuel.



K-2906. April 12, 1959. Viet Nam. 15 km. east of Plei Ku.
View in depression of Humic Gley soil tending
towards Regur.

K-2905. April 12, 1959. Viet Nam. 24 km. east of Phai Koi.
View of Hailty Red Latosol before clearing for
farms. Some low trees have been cut for fuel.

K-2906. April 12, 1959. Viet Nam. 15 km. east of Phai Koi.
View in depression of Humic Grey soil tending
towards Regur.

shedding and the shrubs are full of little puffs of white.

I talk with them quite strongly about farming this soil on the contour, where slopes are more than one to two percent, to get as much water in it as possible and to help maintain the flow of the small streams. At slopes above 3 to 5 percent I think they should have earth terraces to hold the water and to prevent erosion. I am told that they can grow citrus here without irrigation but it does very much better with it. This soil is so friable and the clay in it so inactive that I've never seen a drier soil, not even in the desert. In the roads it grinds into a soft, fluffy dust that almost flows.

We go on toward the town in just terrible red dust. The tribal people here are growing rice in the low places. Now the Vietnamese are also growing it. Besides, they have bananas, arecanut palm, coffee, and sugarcane. This last is the CO 290 from India.

We stop to look at the black soil over basalt. This soil puzzles me. Apparently there was once a deep valley here later filled by basaltic lava from a nearby volcano. There are low ridges where the rock is very close to the surface as great rounded boulders. The soil in the ridges between the boulders is very dark brown clay that is easily friable to small angular nut and granular. There are no wide cracks. Possibly this was once a kind of aa lava that has weathered into round boulders. In the low places one might call the soil an intergrade between Tropical Black Clay (or Regur) and Humic Gley. Certainly it gets ponded in rainy seasons. (K-2906)

shedding and the shrubs are full of little puffs of white.

I talk with them quite strongly about farming this soil on the contour, where slopes are more than one to two percent, to get as much water in it as possible and to help maintain the flow of the small streams. At slopes above 3 to 5 percent I think they should have earth terraces to hold the water and to prevent erosion. I am told that they can grow citrus here without irrigation but it does very much better with it. This soil is so friable and the clay in it so inactive that I've never seen a drier soil, not even in the desert. In the roads it grinds into a soft, fluffy dust that almost flows.

We go on toward the town in just terrible red dust. The tribal people here are growing rice in the low places. Now the Vietnamese are also growing it. Besides, they have bananas, arecanut palm, coffee, and sugarcane. This last is the CO 290 from India.

We stop to look at the black soil over basalt. This soil puzzles me. Apparently there was once a deep valley here later filled by basaltic lava from a nearby volcano. There are low ridges where the rock is very close to the surface as great rounded boulders. The soil in the ridges between the boulders is very dark brown clay that is easily friable to small angular nut and granular. There are no wide cracks. Possibly this was once a kind of aa lava that has weathered into round boulders. In the low places one might call the soil an intergrade between Tropical Black Clay (or Regur) and Humic Gley. Certainly it gets ponded in rainy seasons. (K-2906)

We must hurry. A little way beyond we stop to look at a kind of old island of upland in this low area. The upper two to three feet is dark reddish brown (5YR 3/4) clayey soil over a mass of loose rounded but irregular laterite fragments. I can't see how such a soil could have formed in place. The upper surface of the lateritic gravel is very sharp and I suspect that it is an old terrace from eroding laterite. But I do not know.

We then continue west toward the town on the dark, reddish-brown soil where it is a rather poor Reddish-Brown Latosol intergrading to Earthy Red Latosol. This is probably what Aubert would call a ferruginous ferallitic soil.

The tribal people here grow irrigated paddy in the valleys but have their villages in the hills. About 11:30 we come to the rest house in Plei Ku for an elaborate full course luncheon with about 15 or 20 of the local officials. The lunch is leisurely and I drink much tea. Although I enjoy the rest the time is slipping by. After lunch we hurry to the plane and at 1:22 the wheels leave the ground for Ban Me Thuot.

We go on south roughly over the same route as far as I can tell. The tribal villagers have leveled and banded the narrow, serpentine valleys for paddy. These winding valleys set in a coarse mezzorelief. Other fields are made ready, I am told, for maize, sesame, and berseem. I am told that some of these upland soils also have paddy.

It is soon quite hazy but I think we are following along the main central road.

We must hurry. A little way beyond we stop to look at a kind of old island of upland in this low area. The upper two to three feet is dark reddish brown (2YR 3/4) clayey soil over a mass of loose rounded but irregular laterite fragments. I can't see how such a soil could have formed in place. The upper surface of the lateritic gravel is very sharp and I suspect that it is an old terrace from eroding laterite. But I do not know.

We then continue west toward the town on the dark, reddish-brown soil where it is a rather poor Reddish-Brown Latosol intergrading to Earthy Red Latosol. This is probably what Aubert would call a ferruginous ferallitic soil.

The tribal people here grow irrigated paddy in the valleys but have their villages in the hills. About 11:30 we come to the rest house in Plet Ku for an elaborate full course luncheon with about

15 or 20 of the local officials. The lunch is leisurely and I drink much tea. Although I enjoy the rest the time is slipping by. After lunch we hurry to the plane and at 1:22 the wheels leave the ground for Ban Me Thout.

We go on north roughly over the same route as far as I can tell. The tribal villagers have leveled and banded the narrow, serpentine valleys for paddy. These winding valleys set in a coarse mesorelief. Other fields are made ready, I am told, for maize, sesame, and pears. I am told that some of these upland soils also have paddy. It is soon quite hazy but I think we are following along the main central road.

We pass over fields on old terraces with, perhaps, Earthy Red Latosols. But most of the fields are those of shifting cultivators.

Out about 64 kilometers we fly over a hilly area. Moormann thinks that this is a mixture of Reddish-Brown Latosol, Yellow Latosol, and Red-Yellow Podzolic. Although this last is possible, I have my doubts.

Many of the new clearings under shifting cultivation have curious gray streaks on them marking the piles of ash after burning the logs following clearing. Although I see only a few recently cleared fields here I am sure that most of this land has been under shifting cultivation. My guides say not but I feel quite sure that this area was heavily populated around 100 to 600 years ago. I know of no other way to account for the pattern of secondary forest. Even now there are a few clearings and the number of these increases as we go on. In fact, when we are out about 100 kilometers the fields are quite thick, so the cycle is a bit short. The streaks of gray ash in the fields are very clear and I suspect that some logs were hauled in from the outside to be burned within the fields.

We pass over Me Wal where there is a large rubber plantation. As we come down at Ban Me Thuot I am told that the Americans built the airfield. The wheels are on the ground at 1:58. Here the elevation is 1,200 feet and the annual rainfall 45 inches. But even so the soil is not quite so dry because the rain is better distributed.

We are met by Colonel Nguyen Cao, who is the administrative chief of all land development in the highlands.

We pass over fields on old terraces with, perhaps, Kachya Red
 Lascosols. But most of the fields are those of shifting cultivators.
 Out about 64 kilometers we fly over a hilly area. Moermann
 thinks that this is a mixture of Reddish-Brown Lascosol, Yellow
 Lascosol, and Red-Yellow Podzolic. Although this last is possible,
 I have my doubts.

Many of the new clearings under shifting cultivation have curious
 gray streaks on them marking the piles of ash after burning the logs
 following clearing. Although I see only a few recently cleared fields
 here I am sure that most of this land has been under shifting cultiva-
 tion. My guides say not but I feel quite sure that this area was
 heavily populated around 100 to 600 years ago. I know of no other
 way to account for the pattern of secondary forest. Even now there
 are a few clearings and the number of these increases as we go on.
 In fact, when we are out about 100 kilometers the fields are quite
 thick, so the cycle is a bit short. The streaks of gray ash in the
 fields are very clear and I suspect that some logs were hauled in
 from the outside to be burned within the fields.

We pass over Me Wai where there is a large rubber plantation.
 As we come down at Ban Me Thuot I am told that the Americans built
 the airfield. The wheels are on the ground at 1:28. Here the
 elevation is 1,200 feet and the annual rainfall 42 inches. But even
 so the soil is not quite so dry because the rain is better distributed.
 We are met by Colonel Nguyen Cao, who is the administrative chief
 of all land development in the highlands.

We get into a carry-all and drive toward the north edge of the town and then generally north and east. We pass a village for refugees from the north. The house walls are made of mats and the roofs are thatched. Now it is very sunny and hot. We pass some new teak plantings. I think the soils here are Reddish-Brown Latosol and a bit better than the ones at our earlier stop. I see some small patches of sugarcane with severe nitrogen deficiency.

We pass a nice coffee planting under shade of a tree taken from Indonesia called "lamtoro" (Leucaena glauca). Then we pass a rubber plantation with trees 10 to 15 years old. Beyond is Robusta coffee and also some tall large-leaf Arabica coffee plants of the excelsa variety (Congo coffee). Some of these are 18 feet or more high. We stop for a moment at a freshly cleared field of very gentle slope. The surface soil is a beautiful dark reddish-brown (2.5YR 2½/4).

I am told that there is a big race on here between the Colonel and the old French concession holders. According to recent law they have only a limited time in which to improve their land or they will lose it. And the Colonel is looking for good land like this for the settlers.

This is not only a beautiful soil but apparently highly productive. The secondary shrub is lush and thick. We pass a small herd of fairly good looking cattle.

At 12 kilometers out I stop for pictures in the village of Trum of the Rhade tribe. (K-2907; K-2908; K-2986) I should like to have some of the big baskets used for storage. They are about twice the size of an oil drum.

We get into a carry-all and drive toward the north edge of the town and then generally north and east. We pass a village for refugees from the north. The house walls are made of mats and the roofs are thatched. Now it is very sunny and hot. We pass some new teak plantings. I think the soils here are reddish-brown laterite and a bit better than the ones at our earlier stop. I see some small patches of sugarcane with severe nitrogen deficiency. We pass a nice coffee plantation under shade of a tree taken from Indonesia called "Jamoro" (*Leucaena glauca*). Then we pass a rubber plantation with trees 10 to 15 years old. Beyond is Robusta coffee and also some tall large-leaf Arabica coffee plants of the *excellent* variety (Congo coffee). Some of these are 18 feet or more high. We stop for a moment at a freshly cleared field of very gentle slope. The surface soil is a beautiful dark reddish-brown (2.5YR 2.5/4). I am told that there is a big race on here between the Colonels and the old French concession holders. According to recent law they have only a limited time in which to improve their land or they will lose it. And the Colonel is looking for good land like this for the settlers. This is not only a beautiful soil but apparently highly productive. The secondary scrub is lush and thick. We pass a small herd of fairly good looking cattle. At 12 kilometers out I stop for pictures in the village of Trum of the Rhade tribe. (K-2907; K-2908; K-2986) I should like to have some of the big baskets used for storage. They are about twice the size of an old drum.



K-2907. April 12, 1959. Viet Nam. 12 km. northeast of Ban Me Thuot. View in village of Trum.



K-2908. April 12, 1959. Viet Nam. 12 km. northeast of Ban Me Thuot. Another view in village of Trum.

K-2907. April 12, 1959. Viet Nam. 12 km. northeast of Ban
Me Thout. View in village of Trum.

K-2908. April 12, 1959. Viet Nam. 12 km. northeast of Ban Me Thout.
Another view in village of Trum.



K-2986. April 12, 1959. Viet Nam. 12 km. northeast of Ban Me Thuot.
Woman weaving in tribal village of Trum.

K-2986. April 12, 1959. Viet Nam. 12 km. northeast of Ban Me Thuot.
Women weaving in tribal village of Tnuu.



K-2909. April 12, 1959. Viet Nam. 12 km. northeast of Ban Me Thuot. A group of people on the road nearby.

K-2909. April 12, 1959. Viet Nam. 12 km. northeast of
Ban Me Thuot. A group of people on the road
nearby.

One of the difficulties in this country I am told is the relative scarcity of good perennial streams; but tube wells from 60 to 150 feet usually get good water. As we drive along through the uncleared areas I see quite a few large trees within the lush thickets. Then we pass more coffee under shade some of which is irrigated by diversion of a small stream coming down the side of an old low volcano.

Now we come to the new settlement center, which I understand is one of the President's joys. This is about 19 kilometers north-east of Ban Me Thuot. The name of this place is Ea-Tul but I am told that they are going to change the name to Quang Nhieu. (Moormann tells me that the names of the villages are frequently changed.) The settlers were brought in between April and July 1957. They were taken from the poorer parts of the coastal area and not entirely of their own free will and accord. But I am told that they have been making good money on peanuts and ramie and many are already improving their houses. Some are even building new ones with boards.

As we enter the settlement we pass a large nursery for coffee, citrus, mangoes, and other fruits. Then we go by a new market place which must serve a large number of people. The village is spread out over a considerable area so that each family has a good-sized lot for citrus, bananas, mangoes, and the like. Most houses have walls of fiber mats and thatched roofs. Other buildings have wooden walls and steel roofs but I suspect that most of these are warehouses or government buildings.

One of the difficulties in this country I am told is the

relative scarcity of good perennial streams; but tube wells

from 60 to 120 feet usually get good water. As we drive along

through the uncleared areas I see quite a few large trees within

the lush thickets. Then we pass more coffee under shade some of

which is irrigated by diversion of a small stream coming down the

side of an old low volcano.

Now we come to the new settlement center, which I understand

is one of the President's joys. This is about 19 kilometers north-

east of Ban Me Thout. The name of this place is Ba-Tui but I am

told that they are going to change the name to Quang Nhieu. (Mooreman

tells me that the names of the villages are frequently changed.)

The settlers were brought in between April and July 1957. They were

taken from the poorer parts of the coastal area and not entirely of

their own free will and accord. But I am told that they have been

making good money on peanuts and ramie and many are already improving

their houses. Some are even building new ones with boards.

As we enter the settlement we pass a large nursery for coffee,

citrus, mangoes, and other fruits. Then we go by a new market place

which must serve a large number of people. The village is spread out

over a considerable area so that each family has a good-sized lot for

citrus, bananas, mangoes, and the like. Most houses have walls of

fiber mats and thatched roofs. Other buildings have wooden walls

and steel roofs but I suspect that most of these are warehouses or

government buildings.

I look at two new plantings, one of coffee (K-2987) and one of ramie (K-2911). These have both been established on a communal basis but after the second year the ramie is divided into family plots. I am told that the coffee will be divided a little later. The coffee is now just small transplants, each protected by a conical tent of reeds about two feet high. These fields are nearly level; the soil is beautiful Reddish-Brown Latosol from basalt. It has more firmness and body than the Earthy Red Latosol at Plei Ku.

In the recent land clearing with bulldozers altogether too much soil has been pushed into the windrows with the stumps and bushes. They need the type that has long prongs in front that will do a better job of taking out roots and will shake off the soil. These ridges of soil are uneven and will harbor noxious weeds. (Added later: In the evening I see Mr. Gardner of USOM who is advising the Land Development people on machinery, much of which is furnished by the United States. Dr. Moormann tells him of my recommendation and he replies that he has been making the same one for over a year and has brought in the proper machinery that I described; but so far he hasn't been able to get them to use it.) All they can do now is to work over these windrows and burn the wood during the dry season and bulldoze the soil back.

I drive around through the village and photograph some of the houses (K-2912). They are not wonderful but they are a great deal better than many I have seen in the Tropics. The people seem healthy and friendly (K-2988). I can see no reason why this settlement should not be successful. I emphasize that these soils are especially low in phosphorus and are probably high fixers of phosphorus. I explain

I look at two new plantings, one of coffee (K-2987) and one of ramsie (K-2911). These have both been established on a communal basis but after the second year the ramsie is divided into family plots. I am told that the coffee will be divided a little later. The coffee is now just small transplants, each protected by a conical tent of reeds about two feet high. These fields are nearly level; the soil is beautiful Reddish-Brown Latosol from basalt. It has more firmness and body than the Earthy Red Latosol at Plet Ku. In the recent land clearing with bulldozers altogether too much soil has been pushed into the windrows with the stumps and bushes. They need the type that has long prongs in front that will do a better job of taking out roots and will shake off the soil. These ridges of soil are uneven and will harbor noxious weeds. (Added later: In the evening I see Mr. Gardner of USOM who is advising the Land Development people on machinery, much of which is furnished by the United States. Dr. Moormann tells him of my recommendation and he replies that he has been making the same one for over a year and has brought in the proper machinery that I described; but so far he hasn't been able to get them to use it.) All they can do now is to work over these windrows and burn the wood during the dry season and bulldoze the soil back. I drive around through the village and photograph some of the houses (K-2912). They are not wonderful but they are a great deal better than many I have seen in the Tropics. The people seem healthy and friendly (K-2988). I can see no reason why this settlement should not be successful. I emphasize that these soils are especially low in phosphorus and are probably high fixers of phosphorus. I explain



K-2987. April 12, 1959. Viet Nam. 18 km. northeast of Ban Me Thuot, near Quang Nhieu. Looking across new coffee planting on Reddish-Brown Latosol from basalt into village.

K-2987. April 12, 1959. Viet Nam. 18 km. northeast of Ban Me Thuot,
near Quang Nhieu. Looking across new coffee plantation on
Reddish-brown laterite from basalt lava village.



K-2911. April 12, 1959. Viet Nam. 19 km. northeast of Ban Me Thuot, near Quang Nhieu. Communal ramie planting.



K-2912. April 12, 1959. Viet Nam. 19 km. northeast of Ban Me Thuot, near Quang Nhieu. A typical home.

K-2511. April 12, 1959. Viet Nam. 19 km. northeast of
Ban Me Thout, near Quang Nhon. Communal ramie
planting.

K-2512. April 12, 1959. Viet Nam. 19 km. northeast of
Ban Me Thout, near Quang Nhon. A typical home.



K-2988. April 12, 1959. Viet Nam. 19 km. northeast of Ban Me Thuot, near Quang Nhieu. A group of villagers.

K-2988. April 12, 1959. Viet Nam. 19 km. northeast of Ban Me Thout,
near Quang Thien. A group of villagers.



K-2913. April 12, 1959. Viet Nam. 19 km. northeast of Ban Me Thuot, near Quang Nhieu. A new clearing for crops.

K-2913. April 12, 1959. Viet Nam. 19 km. northeast of Ban Me Thuot,
near Quang Nhieu. A new clearing for crops.

the advantages of local applications of phosphorus and especially of the high analysis ammonium phosphate, such as ammonium metaphosphate. Jurion wrote to me only a few months ago that this material was giving excellent results on the Earthy Red Latosols of the northern Congo.

We are already a little behind schedule and we hurry back toward the plane. I stop only for some pictures in a rubber plantation. (K-2914; K-2915) Except for lunch we have been hurrying all the time, but I suppose one must expect this when trying to see such a large area in one day.

We get into the hot plane at 4:20 and are in the air for Saigon at 4:27.

After we are out a ways I should say that the proportion of cleared fields is about correct for a good cycle of shifting cultivation. About 20 kilometers out there is a sharp mezzo-relief and very few cleared fields. Here there are said to be no roads. But a few kilometers further I see a new road and one small government settlement.

Some hill tops with poor cover are said to have exposed concretionary laterite. Maybe so.

About 80 kilometers out we are over an area with fairly strong relief with some nearly bare hilltops here and there that look like old fields to me; but, of course, laterite may be exposed now. I am told that this general region is called "the plateau of the three borders (frontiers)" and that there are also large areas of good red soil in Laos and Cambodia.

the advantages of local applications of phosphorus and especially of the high analysis ammonium phosphate, such as ammonium metaposphate. Jurion wrote to me only a few months ago that this material was giving excellent results on the Eartly Red Latosols of the northern Congo.

We are already a little behind schedule and we hurry back toward the plane. I stop only for some pictures in a rubber plantation. (K-2914; K-2915) Except for lunch we have been hurrying all the time, but I suppose one must expect this when trying to see such a large area in one day.

We get into the hot plane at 4:30 and are in the air for Saigon at 4:37.

After we are out a ways I should say that the proportion of cleared fields is about correct for a good cycle of shifting cultivation. About 20 kilometers out there is a sharp meso-relief and very few cleared fields. Here there are said to be no roads. But a few kilometers further I see a new road and one small government settlement.

Some hill tops with poor cover are said to have exposed concretionary laterite. Maybe so.

About 80 kilometers out we are over an area with fairly strong relief with some nearly bare hilltops here and there that look like old fields to me; but, of course, laterite may be exposed now. I am told that this general region is called "the plateau of the three borders (frontiers)" and that there are also large areas of good red soil in Laos and Cambodia.



K-2914. April 12, 1959. Viet Nam. 4 km. northeast of Ban Me Thuot. A nice rubber plantation on Reddish-Brown Latosol from basalt.



K-2915. April 12, 1959. Viet Nam. 4 km. northeast of Ban Me Thuot. A close up of tapped rubber tree about 15 years old.

K-2914. April 12, 1959. Viet Nam. 4 km. northeast of
Ban Me Thuot. A nice rubber plantation on
Reddish-Brown Latosol from basalt.

K-2915. April 12, 1959. Viet Nam. 4 km. northeast of
Ban Me Thuot. A close up of tapped rubber tree
about 15 years old.

I am afraid that Dr. Moormann is not quite right about these hilltops. I am sure that some are new fields because I can see the logs. The forest here, however, looks sparse. The fields are not very sloping. As we go on the relief is less.

At about 140 kilometers we cross a small road. There is still some "ray" or shifting cultivation. Here I am again reminded that whole tribes move about and that the first jobs in this region are (1) to establish roads, and (2) to get the tribal villages to be relatively permanent. In another 20 kilometers there is more cleared soil and larger villages. Then further on we are over smooth relief and more roads. The soils appear to be gray or yellowish-gray and I see large rubber plantations. Along the streams there are paddy fields, a very few of which are green with crop now.

About 20 kilometers out of Saigon I again see large areas with dry paddy fields on the soils of the old terraces. Although yields are low, it is said, the total production from this region is very important. Then we come over the intensively developed soils from younger alluvium near Saigon. The wheels are down at 5:32.

My car is here and I am back to the hotel about 5:50.

I try to wash out the red dust, change, and have tea.

At 7:50 we go with Dr. and Mrs. Moormann for dinner chez Wolfe Ladijinski. Present also are the Minister of Agriculture and his wife, Mrs. and Miss Kerr, Mr. and Mrs. ^{J. K.} Gardner of USOM, and Mr. and Mrs. Amoss of ILO.

I am afraid that Dr. Moormann is not quite right about these hills. I am sure that some are new fields because I can see the logs. The forest here, however, looks sparse. The fields are not very sloping. As we go on the relief is less.

At about 140 kilometers we cross a small road. There is still some "ray" or shifting cultivation. Here I am again reminded that whole tribes move about and that the first jobs in this region are (1) to establish roads, and (2) to get the tribal villages to be relatively permanent. In another 20 kilometers there is more cleared soil and larger villages. Then further on we are over smooth relief and more roads. The soils appear to be gray or yellowish-gray and I see large rubber plantations. Along the streams there are paddy fields, a very few of which are green with crop now.

About 20 kilometers out of Saigon I again see large areas with dry paddy fields on the soils of the old terraces. Although yields are low, it is said, the total production from this region is very important. Then we come over the intensively developed soils from younger alluvium near Saigon. The wheels are down at 5:32.

My car is here and I am back to the hotel about 5:50.

I try to wash out the red dust, change, and have tea.

At 7:50 we go with Dr. and Mrs. Moormann for dinner chez Wolfe Ladjinski. Present also are the Minister of Agriculture and his wife, Mrs. and Miss Kerr, Mr. and Mrs. Gardner of USOM, and Mr. and Mrs. Amoss of ILO.

During the evening I chat quite a bit with the Minister about the potentialities of the soils I have seen and agree to send him a letter about my observations. One point not covered in these notes is that cotton should do well on the lowland black soils provided they can have the necessary dusters to protect the crop from insects. This may be a problem with all the kapoc trees around.

The dinner is pleasant although late. We take our leave at 10:00 and are soon back to the hotel and ready for bed.

Added later: My letter to the Minister follows:

Honolulu, Hawaii
21 April, 1959

Mr. Le-Van-Dong
Minister of Agriculture
Saigon, Viet Nam

Dear Mr. Minister:

This letter is intended to serve as a memo of my conversations with you and with the staff during my recent visit to your country.

First of all, both Mrs. Kellogg and I thank you for the many courtesies shown us by yourself and by members of your staff.

Although I shall try to be as specific as possible for clarity, I am sure that you realize the shortness of my time for field observations. And I realize too that often the same goals can be reached in different ways.

1. Within the limitations of our present knowledge, I see no prospect of practical development of the extreme cat clay lands (Plains des Joncs). If it were possible to keep the soils wet essentially all of the time, some rice might be grown although yields would be low. I strongly recommend against drainage of these lands. With drainage, the soils become exceedingly acid; and the cost of lime and other materials for reclamation would be so extremely high that economic returns could not be expected.

During the evening I chat quite a bit with the Minister about the potentialities of the soils I have seen and agree to send him a letter about my observations. One point not covered in these notes is that cotton should do well on the lowland black soils provided they can have the necessary dusts to protect the crop from insects. This may be a problem with all the kapoc trees around. The dinner is pleasant although late. We take our leave at 10:00 and are soon back to the hotel and ready for bed.

Added later: My letter to the Minister follows:

Honolulu, Hawaii
21 April, 1959

Mr. Le-Van-Dong
Minister of Agriculture
Saigon, Viet Nam

Dear Mr. Minister:

This letter is intended to serve as a memo of my conversations with you and with the staff during my recent visit to your country.

First of all, both Mrs. Kellogg and I thank you for the many courtesies shown us by yourself and by members of your staff.

Although I shall try to be as specific as possible for clarity, I am sure that you realize the shortness of my time for field observations. And I realize too that often the same goals can be reached in different ways.

I. Within the limitations of our present knowledge, I see no prospect of practical development of the extreme clay lands (Plains des Jones). If it were possible to keep the soils wet essentially all of the time, some rice might be grown although yields would be low. I strongly recommend against drainage of these lands. With drainage, the soils become exceedingly acid; and the cost of lime and other materials for reclamation would be so extremely high that economic returns could not be expected.

2. I suggest that crop-testing work on the extreme cat clays, which become very acid, be dropped and that instead emphasis be given to soil management research on the soils intermediate between the good soils and the cat clays. Here farmers are now getting low yields of rice. Since these soils are under cultivation and are not extremely acid there are some prospects of increasing yields by the use of lime and fertilizer and with good water controls. Even on these one should avoid more than the minimum drainage for rice production.

3. In my view it would be far more rewarding to emphasize land development and improved soil management for the good upland red soils. Those I saw near Ban MeThuot impressed me as excellent soils. Those near Plei Ku are also good but the soils are somewhat more granular and less retentive of moisture. Although the rainfall is greater on them, the dry season is longer. But in my view a permanent agriculture may be had in either place.

4. On these red soils phosphorus deficiency can be expected. Then too, such soils are high fixers of added phosphorus in forms unavailable to plants. Thus it is desirable to have the phosphatic fertilizer in contact with as little soil as possible. Methods should be used for localizing the placement of the fertilizer a little to the side and a little below the seed.

5. Most crops on the red soils will require nitrogen fertilizer also for good growth. Some benefit may be had from good compost and green manures; but not enough nitrogen can be had in these ways alone.

6. Because of the long transport to these red soils, I suggest methods be studied for the use of concentrated, high-analysis fertilizer. That is, for the same amount of plant nutrients, it requires 3 times the bags, 3 times the storage, 3 times the freight, and 3 times the handling for a 16 percent material than for a 48 percent material. Urea would be much preferred over ammonium sulphate. In the Belgian Congo on similar soils, excellent results have been had with ammonium metaphosphate.

7. Wherever the slope of the upland soil exceeds about one to two percent, cultivation should be done on the contour to encourage maximum water penetration. On slopes greater than three to five percent, contour terraces may be needed for best results with crops like maize and peanuts requiring clean cultivation. These terraces prevent rapid runoff and soil erosion and result in more water entering the soil and in more water in springs and wells.

2. I suggest that crop-testing work on the extreme cat clays, which become very acid, be dropped and that instead emphasis be given to soil management research on the soils intermediate between the good soils and the cat clays. Here farmers are now getting low yields of rice. Since these soils are under cultivation and are not extremely acid there are some prospects of increasing yields by the use of lime and fertilizer and with good water controls. Even on these one should avoid more than the minimum drainage for rice production.

3. In my view it would be far more rewarding to emphasize land development and improved soil management for the good upland red soils. Those I saw near Ban Methuot impressed me as excellent soils. Those near Plet Ku are also good but the soils are somewhat more granular and less retentive of moisture. Although the rainfall is greater on them, the dry season is longer. But in my view a permanent agriculture may be had in either place.

4. On these red soils phosphorus deficiency can be expected. Then too, such soils are high fixers of added phosphorus in forms unavailable to plants. Thus it is desirable to have the phosphatic fertilizer in contact with as little soil as possible. Methods should be used for localizing the placement of the fertilizer a little to the side and a little below the seed.

5. Most crops on the red soils will require nitrogen fertilizer also for good growth. Some benefit may be had from good compost and green manures; but not enough nitrogen can be had in these ways alone.

6. Because of the long transport to these red soils, I suggest methods be studied for the use of concentrated, high-analysis fertilizer. That is, for the same amount of plant nutrients, it requires 3 times the bags, 3 times the storage, 3 times the freight, and 3 times the handling for a 15 percent material than for a 45 percent material. Urea would be much preferred over ammonium sulphate. In the Belgian Congo on similar soils, excellent results have been had with ammonium metaphosphate.

7. Wherever the slope of the upland soil exceeds about one to two percent, cultivation should be done on the contour to encourage maximum water penetration. On slopes greater than three to five percent, contour terraces may be needed for best results with crops like maize and peanuts requiring clean cultivation. These terraces prevent rapid runoff and soil erosion and result in more water entering the soil and in more water in springs and wells.

8. Probably slopes in excess of 12 to 15 percent should be kept in perennial mixed cultures, say bananas, cashewnut trees, mangoes, and the like.

9. When land clearing is done on dry soil, the bulldozers should be fitted with long prongs to shake the soil from the roots. In this way the roots, brush, and trees may be thrown into piles or windrows without soil. Now some recently cleared areas have left-over ridges of soil that should be spread out, else these ridges will harbor noxious weeds.

10. If you are prepared to control insects, I should think that cotton would be a good crop on the deep black soils of the lowlands within the area of red soils, provided they are not subject to flooding. Those shallow to the basaltic rock could produce excellent pastures.

11. As a good persistent forage grass, I suggest that trials be made, on both the black soils and red soils of the uplands, of the improved Bermuda grass from the United States. This grass called Coastal Bermuda, gives especially high yields when given nitrogen fertilizer. It also has high drought resistance.

12. On the red soils I suggest further emphasis on trees. In clearing land it might be better to leave some uncleared strips as windbreaks. Along the roadways, on slopes too steep for cropping, and in any odd bits of wasteland, I suggest the planting of trees useful for fuel or as green manure. I should think too that it would be worthwhile to try cashewnut trees as a cash crop.

13. Finally, I should like to urge your attention to the development of a good library on basic agricultural science and especially on tropical agriculture. The materials in several journals, conference reports, and books, in both English and French, could be very helpful to all the staff dealing with agriculture and land development.

If I can be of further service please give me the opportunity.

Yours respectfully,

Charles E. Kellogg

8. Probably slopes in excess of 12 to 15 percent should be kept in perennial mixed cultures, say bananas, cashewnut trees, mangoes, and the like.

9. When land clearing is done on dry soil, the bulldozers should be fitted with long prongs to shake the soil from the roots. In this way the roots, brush, and trees may be thrown into piles or windrows without soil. Now some recently cleared areas have left-over ridges of soil that should be spread out, else these ridges will harbor noxious weeds.

10. If you are prepared to control insects, I should think that cotton would be a good crop on the deep black soils of the lowlands within the area of red soils, provided they are not subject to flooding. These shallow to the basaltic rock could produce excellent pastures.

11. As a good persistent forage grass, I suggest that trials be made, on both the black soils and red soils of the uplands, of the improved Bermuda grass from the United States. This grass called Coastal Bermuda, gives especially high yields when given nitrogen fertilizer. It also has high drought resistance.

12. On the red soils I suggest further emphasis on trees. In clearing land it might be better to leave some uncleared strips as windbreaks. Along the roadways, on slopes too steep for cropping, and in any odd bits of wasteland, I suggest the planting of trees useful for fuel or as green manure. I should think too that it would be worthwhile to try cashewnut trees as a cash crop.

13. Finally, I should like to urge your attention to the development of a good library on basic agricultural science and especially on tropical agriculture. The materials in several journals, conference reports, and books, in both English and French, could be very helpful to all the staff dealing with agriculture and land development.

If I can be of further service please give me the opportunity.

Yours respectfully,

Charles E. Kellogg

Saigon, le 4 Avril 1960.

N° 3573 BCN/ KH/2

LE SECRETAIRE GENERAL
AU SECRETARIAT D'ETAT A L'AGRICULTURE

à

Monsieur le Docteur Charles E. KELLOGG
Assistant administrator For Soil Survey
United States Department of Agriculture
Washington 25, D-C

Cher Docteur,

J'ai l'honneur d'accuser réception de votre lettre du 26 Février 1960 et de la copie de votre lettre adressée le 21 Avril 1959 à M. le Secrétaire d'Etat à l'Agriculture.

Je vous en remercie vivement et vous demande de bien vouloir m'excuser pour le dérangement que je vous ai apporté.

Les suggestions que vous avez bien voulu nous faire concernant nos terres alunées et nos terres rouges, seront étudiées par nos services compétents.

Veuillez agréer, Cher Docteur, les assurances de ma haute considération./-



Châu-Tâm

Châu-Tâm
KỸ-SƯ NÔNG-NGHỀ

April 13

We are up at 5:45, pack, and have breakfast. In addition to the rest of the baggage Mommy has one of the pretty Vietnamese hats made from a palm called latanier (latenia).

We go to the airport about 7:40 and check in with the usual confusion of a French station. Dr. Moormann helps us through customs. Then we discover that the plane is to be a bit late. Several are there to see us off but mainly the same ones that met us in the hotel the first morning. Mr. Tan gives me quite a lecture on the need for finding a way to get the common people actively supporting their programs for social improvement through better opportunity. He says that active participants are not subject to communist doctrine but that passive ones are. He promises to send me a book he has written about it.

We get in the plane and are in the air for Hong Kong at 10:00 a.m. - an hour late.

For the first little way we pass over the paddy land of the terrace that I saw yesterday with only a little irrigation. Gradually the proportion of forest increases and in about 10 miles we are over nearly solid forest with an unevenness that suggests very old shifting cultivation. Out about 45 miles there are a few cleared fields but certainly the population was once more dense. The mezzo-relief suggests basalt, with some level areas that are probably grass-covered black soils. Population continues to be sparse but one sees the odd cleared field under "ray."

April 13

We are up at 5:45, pack, and have breakfast. In addition to

the rest of the baggage Mommy has one of the pretty Vietnamese

hats made from a palm called lantenier (lantenia).

We go to the airport about 7:40 and check in with the usual

confusion of a French station. Dr. Moormann helps us through

customs. Then we discover that the plane is to be a bit late.

Several are there to see us off but mainly the same ones that

met us in the hotel the first morning. Mr. Tan gives me quite

a lecture on the need for finding a way to get the common people

actively supporting their programs for social improvement through

better opportunity. He says that active participants are not

subject to communist doctrine but that passive ones are. He

promises to send me a book he has written about it.

We get in the plane and are in the air for Hong Kong at

10:00 a.m. - an hour late.

For the first little way we pass over the paddy land of the

terrace that I saw yesterday with only a little irrigation. Gradu-

ally the proportion of forest increases and in about 10 miles we

are over nearly solid forest with an unevenness that suggests very

old shifting cultivation. Out about 45 miles there are a few

cleared fields but certainly the population was once more dense.

The meso-relief suggests basalt, with some level areas that are

probably grass-covered black soils. Population continues to be

sparse but one sees the odd cleared field under "ray."

Out about 150 miles we fly very high over a large new clearing that I take to be another settlement on the upland red soils. Beyond, I see considerable shifting cultivation. I suspect that some of the hill tops are laterite with thin grass cover. Soon we are over almost continuous forest with many stretches without fields. This emptiness may be due partly to scarce supplies of water. At around 200 miles out the land is somewhat lower, better watered, and more used for crops in permanent fields. Then apparently we leave the hilly basaltic area for either a lower and smoother basaltic plateau or an old somewhat dissected terrace. There is a high proportion of reddish-brown fields. In the higher hills to the west I can see the fires of the shifting cultivators.

Then at 270 miles or so we go over a very poor strongly dissected area covered mainly with thin savanna. The colors are yellow and yellowish-red. There are very few fields except along the streams. We pass a wide area of this poor country with forest only on the hill tops. The dark brown slopes suggest laterite.

At 11:00 a.m., perhaps 350 miles out, I see broader valleys, better soils, and much more population. The coastal terraces are nearly all covered with fields. Next to the sea is a sandy beach with only a narrow, swampy tidal marsh and backwater between the upland terrace and the beach.

Out about 120 miles we fly very high over a large new clearing that I take to be another settlement on the upland red soils. Beyond, I see considerable shifting cultivation. I suspect that some of the hill tops are laterite with thin grass cover. Soon we are over almost continuous forest with many stretches without fields. This emptiness may be due partly to scarce supplies of water. At around 200 miles out the land is somewhat lower, better watered, and more used for crops in permanent fields. Then apparently we leave the hilly basaltic area for either a lower and smoother basaltic plateau or an old somewhat dissected terrace. There is a high proportion of reddish-brown fields. In the higher hills to the west I can see the fires of the shifting cultivators.

Then at 270 miles or so we go over a very poor strongly dissected area covered mainly with thin savanna. The colors are yellow and yellowish-red. There are very few fields except along the streams. We pass a wide area of this poor country with forest only on the hill tops. The dark brown slopes suggest laterite.

At 11:00 a.m., perhaps 350 miles out, I see broader valleys, better soils, and much more population. The coastal terraces are nearly all covered with fields. Next to the sea is a sandy beach with only a narrow, swampy tidal marsh and backwater between the upland terrace and the beach.

At 11:05 a.m., Saigon time, which is 1:05 p.m. Hong Kong time, we leave the coast of Viet Nam near Qui Nhon. Then we have water except for the odd tiny island.

We prepare to land in Hong Kong at 2:30 but the clouds are thick and low. Mommy sleeps while the pilot has a lot of trouble getting the plane down. The wheels are on the ground at 2:50.

This airport is crowded and very poorly organized. Either American Express failed to make our reservations, which they said were confirmed, or else the hotel Peninsula canceled them for some one else. Anyway we are told to go to the Astor Hotel. Going through customs is easy enough once we get there. We are then guided into a crowded little bus and wait some more. The bus leaves at 4:32 - almost two hours after we land!

We register at the Astor Hotel and get to our room about 5:10.

We walk over to the Pan Am office only to find it closed. We come back, rest for awhile, have dinner at 8:15, take a short walk, and then to bed.

At 11:05 a.m., Saigon time, which is 1:05 p.m. Hong Kong

time, we leave the coast of Viet Nam near Qui Nhon. Then we

have water except for the odd tiny island.

We prepare to land in Hong Kong at 2:30 but the clouds are

thick and low. Mommy sleeps while the pilot has a lot of trouble

getting the plane down. The wheels are on the ground at 2:50.

This airport is crowded and very poorly organized. Richer

American Express failed to make our reservations, which they said

were confirmed, or else the hotel Peninsula canceled them for some

one else. Anyway we are told to go to the Astor Hotel. Going

through customs is easy enough once we get there. We are then

guided into a crowded little bus and wait some more. The bus leaves

at 4:32 - almost two hours after we land!

We register at the Astor Hotel and get to our room about 5:10.

We walk over to the Pan Am office only to find it closed. We

come back, rest for awhile, have dinner at 8:15, take a short walk,

and then to bed.





April 14

Last night I had to go back to the paregoric and kaolin. I am not surprised after the strenuous three days in Saigon and the confusion in the airport here. Fortunately I fall asleep again and by breakfast time I feel well but tired.

We check our reservations at Pan Am and walk over to the Hallmark tailors where we order some clothes. We repack to send some things home and do some window shopping.

After lunch we work on the Saigon notes until time to go to the tailor for fittings.

Then dinner, notes, and to bed.

April 14

Last night I had to go back to the paragonic and kaolin.
I am not surprised after the strenuous three days in Saigon and
the confusion in the airport here. Fortunately I fell asleep
again and by breakfast time I feel well but tired.
We check our reservations at Pan Am and walk over to the
Hailmark callers where we order some clothes. We repack to send
some things home and do some window shopping.
After lunch we work on the Saigon notes until time to go to
the callor for fittings.
Then dinner, notes, and to bed.

April 15

We are up in a gray, warm, humid morning. At 9:00 we leave for a tour of Hong Kong. First we cross the ferry amidst many boats of all ages and sizes. I register at the American Consulate and then we ride up to the top of Victoria Peak on the cable car. There our driver meets us and we go to the Tiger Balm Garden. This is a very elaborate series of structures with many painted figures in groups representing legends and fairy tales. Many of these are humorous; some have religious motifs.

From the height of the pagoda in the garden I can look across a small valley to a steep rocky slope terraced for vegetables. (K-2989) Those living in the poor shanties are said to be refugees from China.

Even many of the older buildings in the city below us have these refugee huts on the roof tops.

Then we drive out into the country for a tour around the island. Most of the land is very hilly with a cover of mixed poor grass, shrubs, and some trees, including pine. The soils are Lithosols tending toward Yellow Latosol. Here and there the rocks have been laterized and have rehardened in the road cuts. There are not many perennial streams in these hills. There are small triangular deltas from some of the larger drainageways and enough beach here and there for houses and hotels. Some houses and other buildings are set high in the hills.

We stop at Repulse Bay for tea and drive on to Aberdeen. Here there is some soil on old stream terraces that has been made into terraced plots for vegetables and there seems to be enough water for irrigation. (K-2990). In the sheltered cove there are literally

April 12

We are up in a gray, warm, humid morning. At 9:00 we leave for a tour of Hong Kong. First we cross the ferry amidst many boats of all ages and sizes. I register at the American Consulate and then we ride up to the top of Victoria Peak on the cable car. There our driver meets us and we go to the Tiger Balm Garden. This is a very elaborate series of structures with many painted figures in groups representing legends and fairy tales. Many of these are humorous; some have religious motifs.

From the height of the pagoda in the garden I can look across a small valley to a steep rocky slope terraced for vegetables. (K-2989) Those living in the poor shanties are said to be refugees from China. Even many of the older buildings in the city below us have these refugee huts on the roof tops.

Then we drive out into the country for a tour around the island. Most of the land is very hilly with a cover of mixed poor grass, shrubs, and some trees, including pine. The soils are Lithosols trending toward Yellow Latosol. Here and there the rocks have been laterized and have rehardened in the road cuts. There are not many perennial streams in these hills. There are small triangular deltas from some of the larger drainageways and enough beach here and there for houses and hotels. Some houses and other buildings are set high in the hills.

We stop at Repulse Bay for tea and drive on to Aberdeen. Here there is some soil on old stream terraces that has been made into terraced plots for vegetables and there seems to be enough water for irrigation. (K-2990). In the sheltered cove there are literally



K-2989. April 15, 1959. Hong Kong. Refugees from China using very steeply sloping soil for vegetables.

K-2509. April 15, 1959. Hong Kong. Refugees from China using very steeply sloping soil for vegetables.

hundreds of boats. Many of these serve in the
fishery boats, and some are for transporting goods.



K-2990. April 15, 1959. Hong Kong. Vegetable growing near
Aberdeen.

K-2990. April 12, 1959. Hong Kong. Vegetable growing near
Aberdeen.

hundreds of boats. Many of these serve in lieu of houses; others are fishing boats, and some are for transporting goods. (K-2991) Out from the shore a little way are some very elaborate restaurant boats.

We continue on through the Dairy Farm, past the University, and along a large fish market to the ferry. Then we are back to our hotel for lunch about 2:00.

After lunch we go over to the tailors for a fitting of our clothing and return to the hotel for rest. I complete the draft of a letter to the Minister of Agriculture of Viet Nam.

Then we have dinner and go back to the tailors for our clothing. Part of it is ready and we bring that back to the hotel. The remainder comes at 10:00 p.m. and we are soon ready for bed.

hundreds of boats. Many of these serve in lieu of houses; others are

fishing boats, and some are for transporting goods. (K-2991) Our

from the shore a little way are some very elaborate restaurant boats.

We continue on through the Dairy Farm, past the University, and

along a large fish market to the ferry. Then we are back to our hotel

for lunch about 2:00.

After lunch we go over to the tailors for a fitting of our

clothing and return to the hotel for rest. I complete the draft

of a letter to the Minister of Agriculture of Viet Nam.

Then we have dinner and go back to the tailors for our clothing.

Part of it is ready and we bring that back to the hotel. The remainder

comes at 10:00 p.m. and we are soon ready for bed.



K-2991. April 15, 1959. Hong Kong. Boats at Aberdeen. Many are used as homes. Note black fish nets drying on masts.

K-2991. April 15, 1959. Hong Kong. Boats at Aberdeen. Many are
used as homes. Note black fish nets drying on masts.

April 16

Last night was broken by a drunken, noisy BOAC crew across the hall. We are up at 6:00 a.m., pack, pay the hotel bill, and have our breakfast. About 7:35 we go to the Pan Am office and check in for the flight to Tokyo. The bus takes us out to the airport, where we wait in separate stages of moving toward the plane. We board at 9:30 and are off at 9:53 a.m.

We have a comfortable ride above the clouds and are down in rainy misty weather in Tokyo airport at 4:27. We are through customs rapidly and get into a limousine for the Imperial Hotel. But the traffic is heavy and movement is slow. We register at 5:55 and go to our room.

We unpack and go to dinner as a part of a preliminary exploration. The old part of the hotel, designed by Frank Lloyd Wright, is attached with a bridge to a new hotel. There are many dining rooms, bars, winding staircases, and little underground shops.

Soon after dinner Mr. John D. Motz, Assistant Agricultural Attaché from the American Embassy calls and says he has a car and a trip lined up for us tomorrow.

We read awhile and are early to bed.

April 16

Last night was broken by a drunken, noisy BOAC crew across the hall. We are up at 6:00 a.m., pack, pay the hotel bill, and have our breakfast. About 7:35 we go to the Pan Am office and check in for the flight to Tokyo. The bus takes us out to the airport, where we wait in separate stages of moving toward the plane. We board at 9:30 and are off at 9:53 a.m.

We have a comfortable ride above the clouds and are down in rainy misty weather in Tokyo airport at 4:27. We are through customs rapidly and get into a limousine for the Imperial Hotel. But the traffic is heavy and movement is slow. We register at 5:55 and go to our room.

We unpack and go to dinner as a part of a preliminary exploration. The old part of the hotel, designed by Frank Lloyd Wright, is attached with a bridge to a new hotel. There are many dining rooms, bars, winding staircases, and little underground shops. Soon after dinner Mr. John D. Mott, Assistant Agricultural Attaché from the American Embassy calls and says he has a car and a trip lined up for us tomorrow. We read awhile and are early to bed.

April 17

For some reason I do not sleep after 5:00 a.m. so I get up and plan a short walk. I have never seen a hotel with so many corridors and staircases. One needs a guide and compass to find his way about. At this hour all the exits are closed except one, which I find after several tries.

After breakfast we are met by Mr. Motz and Mr. F. Aoki from the Japanese Ministry of Agriculture. We leave at 9:07 a.m. to drive out in the country north of northwest of Tokyo in the Saitama Prefecture through Urawa and Konosu.

We pass many new large buildings and a few older small ones that apparently survived the war. It seems to me that most of the city is a bit drab and reminds me of Moscow except that there are more signs and more litter here.

I am told that a great many acres of agricultural land are now being put into urban use for new factories, houses, and broader highways. We pass mixed urban land and wettish paddy land. This seems to be an alluvial plain. The areas for buildings and some areas for vegetables, wheat, and barley seem to have been built up by bedding and transported earth about 30 inches above the main level. They get one rice crop here from transplants made in June.

The road then takes us over brown upland that looks to be an old terrace, probably of reworked volcanic ash. The road margins are mostly built up with rather poor houses.

April 17

For some reason I do not sleep after 2:00 a.m. so I get up

and plan a short walk. I have never seen a hotel with so many corridors and staircases. One needs a guide and compass to find his way about. At this hour all the exits are closed except one, which I find after several tries.

After breakfast we are met by Mr. Mote and Mr. F. Aoki from the Japanese Ministry of Agriculture. We leave at 9:07 a.m. to

drive out in the country north of northwest of Tokyo in the

Saitama Prefecture through Utsunomiya and Maebashi.

We pass many new large buildings and a few older small ones that apparently survived the war. It seems to me that most of the city is a bit drab and reminds me of Moscow except that there are more signs and more litter here.

I am told that a great many acres of agricultural land are now being put into urban use for new factories, houses, and broader highways. We pass mixed urban land and wetland paddy land. This seems to be an alluvial plain. The areas for buildings and some areas for vegetables, wheat, and barley seem to have been built up by bedding and transported earth about 30 inches above the main level. They get one rice crop here from transplants made in June.

The road then takes us over brown upland that looks to be an old terrace, probably of reworked volcanic ash. The road margins are mostly built up with rather poor houses.

We come to Urawa and call at the prefecture agricultural offices where we are met by two gentlemen and they give us some facts about this area.

The average size of the family holding is said to be 2 acres. Some of these are fragmented but they now have underway a program for consolidation. The farm income in the prefecture includes 55 billion yen for rice, which yields about 3 metric tons per hectare of hulled brown rice. (I am told that last year the highest yields in Japan ran about 10 metric tons per hectare.) They say that the farm income for wheat and barley is about 10 billion yen. The yields of wheat are about like those of rice, and barley about 20 percent more. They say they have the highest yielding wheat in Japan.

Vegetables and fruit are increasing because of a larger population in the prefecture. The vegetables include edible burdock, carrots, cabbage, and onions. The fruits consist mainly of pears. They have some 2,000 hectares of tea and 20,000 hectares of mulberry plantings. The government is asking farmers to reduce these and substitute food crops. Apparently this isn't easy since 10 percent of the income is from cocoons. They have about 23,000 milk cows in the area besides hogs and chickens. Both milk cows and poultry are increasing. Nearly every farmer has a cow or bullock for draft. But now out of 160,000 farms, 13,000 have garden-type tractors. Most farmers with the tractors get rid of the bullocks. They tell me that about 2.4 billion yen are used for chemical fertilizer,

me that about 2.4 billion yen are used for chemical fertilizer. Most farmers with the tractors get rid of the bullocks. They tell But now out of 160,000 farms, 13,000 have garden-type tractors. are increasing. Nearly every farmer has a cow or bullock for draft. in the area besides hogs and chickens. Both milk cows and poultry of the income is from cocoons. They have about 23,000 milk cows substitute food crops. Apparently this isn't easy since 10 percent plantings. The government is asking farmers to reduce these and They have some 2,000 hectares of tea and 20,000 hectares of mulberry carrots, cabbage, and onions. The fruits consist mainly of pears. tion in the prefecture. The vegetables include edible burdock, Vegetables and fruit are increasing because of a larger popula- Japan. 20 percent more. They say they have the highest yielding wheat in The yields of wheat are about like those of rice, and barley about that the farm income for wheat and barley is about 10 billion yen. yields in Japan ran about 10 metric tons per hectare. They say hectare of bulled brown rice. (I am told that last year the highest 22 billion yen for rice, which yields about 3 metric tons per for consolidation. The farm income in the prefecture includes Some of these are fragmented but they now have underway a program The average size of the family holding is said to be 2 acres. facts about this area. offices where we are met by two gentlemen and they give us some We come to Urawa and call at the prefecture agricultural

which, I understand, amounts to about 80 percent of the farmer's off-farm cash expenditures for production. Some night soil is being used but this is very rapidly declining. The hotels and the good markets now take vegetables only from farms using chemical fertilizers and not night soil.

We continue on toward Konosu. Mr. Masao Seyamo of the prefecture office accompanies us. It is still nearly all built up along the roadsides for quite a ways. In the shopping portions large branches of artificial flowers are fastened on the street light poles and some of the other poles. Most of the houses have tile roofs but some are thatched and some are steel.

We pass Ageo. I see tea growing without shade on brownish soil from volcanic ash reworked by water. Along here there are quite a few tall hedges, mainly of cyprus, as windbreaks. I understand that wind is often a problem in growing fruit and late rice. It is hard to see much of the fields because of the hedges and the many houses along the roadside. Traffic is heavy and the road is narrow. Here there is more color with elaborate street lights and signs but most houses are unpainted. The main crops that I see now are barley and wheat in rows wide enough for cultivation. These are green and lush and are now forming heads. We pass a few groves of oak and "pole" wood, a bit like poplar, used for making sandals. When a daughter is born a family plants two of these trees for her dowry chest. We pass through Okegawa. Traffic is bad here. It would not be so bad if the big trucks did not have the custom of driving squarely down the middle of the road.

which, I understand, amounts to about 80 percent of the farmer's off-farm cash expenditures for production. Some night soil is being used but this is very rapidly declining. The hotels and the good markets now take vegetables only from farms using chemical fertilizers and not night soil.

We continue on toward Konosu. Mr. Masao Seyama of the prefecture office accompanies us. It is still nearly all built up along the roadides for quite a ways. In the shopping portions large branches of artificial flowers are fastened on the street light poles and some of the other poles. Most of the houses have tile roofs but some are thatched and some are steel.

We pass Agoe. I see tea growing without shade on brownish soil from volcanic ash reworked by water. Along here there are quite a few tall hedges, mainly of cypress, as windbreaks. I understand that wind is often a problem in growing fruit and late rice. It is hard to see much of the fields because of the hedges and the many houses along the roadside. Traffic is heavy and the road is narrow. Here there is more color with elaborate street lights and signs but most houses are unpainted. The main crops that I see now are barley and wheat in rows wide enough for cultivation. These are green and lush and are now forming heads. We pass a few groves of oak and "pole" wood, a bit like poplar, used for making sandals. When a daughter is born a family plants two of these trees for her dowry chest. We pass through Okagawa. Traffic is bad here. It would not be so bad if the big trucks did not have the custom of driving squarely down the middle of the road.

We have passed some more fields of wheat and barley, some bright yellow patches of rape, and a few plantings of pears.

We now come to Konosu without having any chance to stop for pictures or to look at the crops. Now I discover that we must stop here and meet with the Mayor and other officials. This town was recently made into a city by a grouping of several villages.

I am told that now essentially all farmers are owners of the land they cultivate, although there are some landless laborers and they use some itinerant laborers at harvest time. But mainly the agricultural work is done by the owner and his family. For more than 100 years they have made dolls as an important cottage industry in this area. Other cottage industries include tile making, silks, footwear, and music boxes.

Again here we have green tea and get back in the cars with our hosts to visit a village called Kasawara. On the way we pass through the grounds of the national agricultural experiment station. This, like the land around, is irrigated by canal water brought in from distant mountains.

I see a good deal of barley in rows for cultivation and many mulberry plantings some of which are interplanted with broad beans and other vegetables.

But still we cannot go into the fields. We must take off our shoes and meet with the leaders of the local cooperative!

We have passed some more fields of wheat and barley, some

bright yellow patches of rape, and a few plantings of pears.

We now come to Konoan without having any chance to stop

for pictures or to look at the crops. Now I discover that we

must stop here and meet with the Mayor and other officials.

This town was recently made into a city by a grouping of several

villages.

I am told that now essentially all farmers are owners of the

land they cultivate, although there are some landless laborers

and they use some itinerant laborers at harvest time. But mainly

the agricultural work is done by the owner and his family. For

more than 100 years they have made dolls as an important cottage

industry in this area. Other cottage industries include tile

making, silk, footwear, and music boxes.

Again here we have green tea and get back in the cars with

our hosts to visit a village called Kasawara. On the way we pass

through the grounds of the national agricultural experiment station.

This, like the land around, is irrigated by canal water brought in

from distant mountains.

I see a good deal of barley in rows for cultivation and many

mulberry plantings some of which are interplanted with broad beans

and other vegetables.

But still we cannot go into the fields. We must take off our

shoes and meet with the leaders of the local cooperative!

The cooperative has 494 members, with an average holding of 1.15 hectares. From much of the land they get two crops; rice, and wheat or barley. They have a total savings of 45,000,000 yen (about \$117,000 U.S.) in the cooperative.

This is a multiple purpose cooperative for credit, marketing, and the buying of farm supplies.

I am told that each village has a cooperative. These are grouped at the prefecture level and these, in turn, are nationally federated.

This cooperative here handles the rice, wheat, and barley. A special cooperative housed in this office handles the silk cocoons; still another handles the fruits and vegetables; and there are special cooperatives for cottage industries.

The highest loan handled is for 50,000 yen, about \$130 U.S. A borrower must have two co-signers. Loans are given only for agricultural production with the expected crop as security. Items for the household are purchased through the cooperative but they must come from savings. The only food items sold to the farmers by the cooperative are edible oils.

I am told that the government fixes the price of rice. Farmers deliver about 80 percent of the crop. They hold back some for their own use and for "special" sale (black market). Sometimes the prices in the black market are higher and sometimes lower than the government price. Now they are about the same.

The cooperative has 494 members, with an average holding of 1.15 hectares. From much of the land they get two crops: rice, and wheat or barley. They have a total savings of 45,000,000 yen (about \$17,000 U.S.) in the cooperative.

This is a multiple purpose cooperative for credit, marketing, and the buying of farm supplies.

I am told that each village has a cooperative. These are grouped at the prefecture level and these, in turn, are nationally federated.

This cooperative here handles the rice, wheat, and barley. A special cooperative housed in this office handles the silk cocoons; still another handles the fruits and vegetables; and there are special cooperatives for cottage industries.

The highest loan handled is for 50,000 yen, about \$130 U.S. A borrower must have two co-signers. Loans are given only for agricultural production with the expected crop as security. Items for the household are purchased through the cooperative but they must come from savings. The only food items sold to the farmers by the cooperative are edible oils.

I am told that the government fixes the price of rice. Farmers deliver about 80 percent of the crop. They hold back some for their own use and for "special" sale (black market). Sometimes the prices in the black market are higher and sometimes lower than the government price. Now they are about the same.

Every person gets a ration of 1,500 grams of rice. More can be had at the black market. I take it that the frequency of these rations depends upon supplies. Japan is now importing rice from Spain, Italy, Formosa, Thailand, and elsewhere.

It is said that the biggest source of black market rice comes from farm women dipping into the household stores to get money for themselves and children. The money for that delivered to the cooperative is credited to the husbands and apparently some are not generous.

Most farmers pay about 20 percent cash for fertilizer. That used on the rice is paid from the sale of wheat which is harvested shortly thereafter. That used on wheat is paid from the sale of rice. So the loans are quite short-term.

When they contract to deliver the rice they are given a pre-payment of 25 percent.

In this village a little over half the income is from rice and the rest is mainly from wheat, barley, and silk cocoons. Since the government has asked for a reduction in cocoons some farmers are growing mushrooms.

Now we must have lunch, which is made up of sandwiches that we brought from the hotel and milk and fruit furnished by our hosts. I feel sure that we can get into the fields now; but this is not to be! Two farmers have been brought in to tell me their stories. I can see all of the time slipping away so I suggest we hear them

Every person gets a ration of 1,500 grams of rice. More can be had at the black market. I take it that the frequency of these rations depends upon supplies. Japan is now importing rice from Spain, Italy, Formosa, Thailand, and elsewhere. It is said that the biggest source of black market rice comes from farm women dipping into the household stores to get money for themselves and children. The money for that delivered to the cooperative is credited to the husbands and apparently some are not generous. Most farmers pay about 20 percent cash for fertilizer. That used on the rice is paid from the sale of wheat which is harvested shortly thereafter. That used on wheat is paid from the sale of rice. So the loans are quite short-term. When they contract to deliver the rice they are given a pre-payment of 25 percent. In this village a little over half the income is from rice and the rest is mainly from wheat, barley, and silk cocoons. Since the government has asked for a reduction in cocoons some farmers are growing mushrooms. Now we must have lunch, which is made up of sandwiches that we brought from the hotel and milk and fruit furnished by our hosts. I feel sure that we can get into the fields now; but this is not to be! Two farmers have been brought in to tell me their stories. I can see all of the time slipping away so I suggest we hear them

on their farms rather than here. To my amazement they all agree. As one might expect these farms are somewhat larger than the average - each a bit over 2 hectares - but the families are large.

Along the road and some of the paths the soil is moderately well drained. Some of the slight elevation is perhaps natural and some due to bedding from making the canals. All the houses are grouped fairly close together on these higher terraces, which leaves a broad expanse of nearly flat Humic Gley-Alluvial intergrade without buildings on it. When moist the cultivated soil is dark gray and when dry it is medium gray mottled with strong brown.

I try photographs of the barley in rows (K-2917; K-2926) and of the mulberries which are cut back each year (K-2916; K-2923)

Cucumbers are grown on compost in raised beds with sheet plastic cover (K-2918). This compost has enough fresh rice straw and nitrogen to make a kind of hot bed.

Mushrooms are grown in two ways: Some grow on partially composted rice straw that has had some bran and ammonium sulphate added to it, together with a surface one-inch layer of soil taken below one foot from the field and mixed with a little lime. Partly they are grown in low beds that are kept covered with rice mats and steel over the top. (K-2922) Some are grown in little houses about 6 feet high with tiers of beds on either side of a central hallway.

I see their new rice beds for growing transplants. By covering these with plastic sheets they get early germination and early crops ahead of the typhoons. (K-2920)

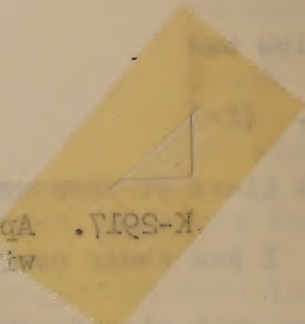
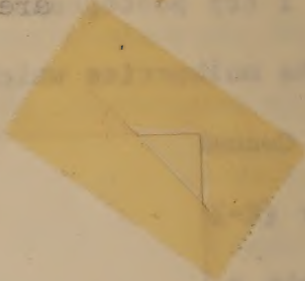
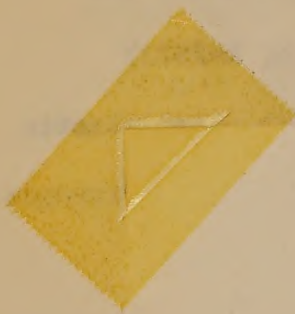
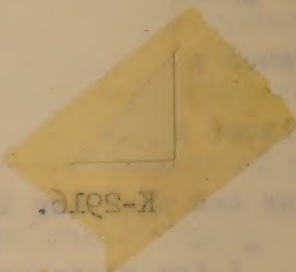
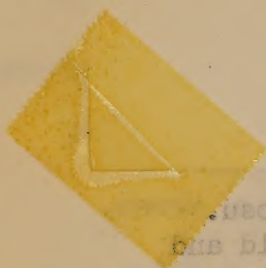
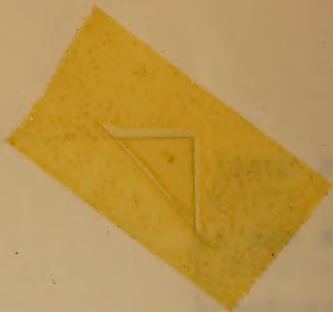
on their farms rather than here. To my amazement they all agree.
As one might expect these farms are somewhat larger than the
average - each a bit over 2 hectares - but the families are large.
Along the road and some of the paths the soil is moderately
well drained. Some of the slight elevation is perhaps natural
and some due to bedding from making the canals. All the houses
are grouped fairly close together on these higher terraces, which
leaves a broad expanse of nearly flat Humic Gley-Aluvial intergrade
without buildings on it. When moist the cultivated soil is dark
gray and when dry it is medium gray mottled with strong brown.
I try photographs of the barley in rows (K-2917; K-2926) and
of the mulberries which are cut back each year (K-2916; K-2923)
Cucumbers are grown on compost in raised beds with sheet plastic
cover (K-2918). This compost has enough fresh rice straw and nitrogen
to make a kind of hot bed.
Mushrooms are grown in two ways: Some grow on partially composted
rice straw that has had some bran and ammonium sulphate added to it,
together with a surface one-inch layer of soil taken below one foot
from the field and mixed with a little lime. Partly they are grown
in low beds that are kept covered with rice mats and steel over the
top. (K-2922) Some are grown in little houses about 6 feet high
with tiers of beds on either side of a central hallway.
I see their new rice beds for growing transplants. By covering
these with plastic sheets they get early germination and early crops
ahead of the typhoons. (K-2920)



K-2916. April 17, 1959. Japan. Near Konosu. Mulberries. These are 15 years old and are cut back each year.



K-2917. April 17, 1959. Japan. Near Konosu. Barley with mulberries in background.



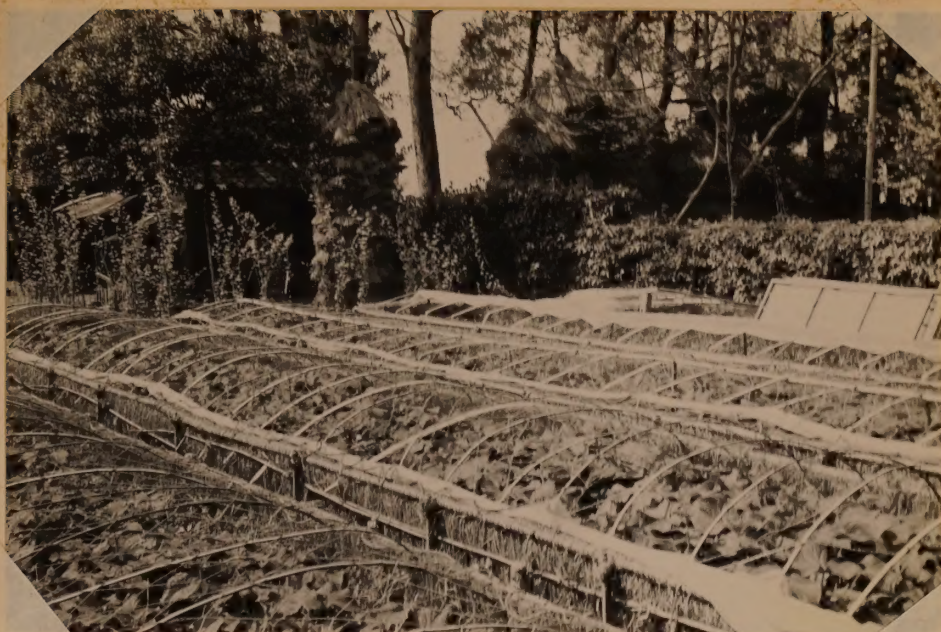
K-2916. April 17, 1959. Japan. Near Konoan. Barley.
Mulberries. These are 15 years old and
I cut back each year.

K-2917. April 17, 1959. Japan. Near Konoan. Barley.
with mulberries in background.



K-2926. April 17, 1959. Japan. Near Konosu. Barley
with a farm home in background.

K-2926. April 17, 1959. Japan. Near Honosu. Barley
with a farm home in background.



K-2918. April 17, 1959. Japan. Near Konosu. Cucumbers in compost hot beds started with plastic covers.



K-2920. April 17, 1959. Japan. Near Konosu. Rice bed using plastic sheets for early seedings.

K-2918.

April 17, 1959. Japan. Near Komsan. Cucumbers
in compost hot beds started with plastic covers.

K-2920.

April 17, 1959. Japan. Near Komsan. Hot bed
using plastic sheets for early seedlings.

All of this area is irrigated from a large canal. (K-2921; K-2919) I am told that farmers pay 500 yen per acre for irrigation water. (I don't know why they keep giving me figures some in the metric system and some in the English system. I raise the question each time and each time I am told the figure is correct.)

We stop in the farmer's home a few moments. (K-2924) It is said not to be an old one - not more than 200 years old. (K-2925) The floor is earthen and there is little furniture. But it seems to be clean. They have chickens and a milk cow.

Then we walk over to another farm where the house is a bit larger. This one has chickens, pigs, and a few rabbits. The chickens are given a prepared feed obtained through the cooperative. The pigs are fed barley polishings, wheat bran, and the remains from the preparation of soy beans and other food for the family. This farm like the other has a machine for making rope out of rice straw run by a little electric motor. Little electric motors are also used for pumping water out of the canal. Both farms have garden-type tractors and no draft cattle.

The main crops are rice, barley, wheat, mulberries, and cucumbers. Some of the mulberries are interplanted with vegetables and a little vetch. Both farms have little patches of tea as well as mushrooms.

Our Tokyo guide says that these farmhouses are a bit below middle class but they look better than most I have seen today.

We go on back to the cooperative. They have a fine storehouse here for rice and other crops with humidity and temperature controls and walls that are thoroughly rat proof.

All of this area is irrigated from a large canal. (K-2921;
 K-2919) I am told that farmers pay 500 yen per acre for irrigation
 water. (I don't know why they keep giving me figures some in the
 metric system and some in the English system. I raise the question
 each time and each time I am told the figure is correct.)
 We stop in the farmer's home a few moments. (K-2924) It is
 said not to be an old one - not more than 200 years old. (K-2925)
 The floor is earthen and there is little furniture. But it seems
 to be clean. They have chickens and a milk cow.
 Then we walk over to another farm where the house is a bit
 larger. This one has chickens, pigs, and a few rabbits. The chickens
 are given a prepared feed obtained through the cooperative. The pigs
 are fed barley polishings, wheat bran, and the remains from the prepa-
 ration of soy beans and other food for the family. This farm like
 the other has a machine for making rope out of rice straw run by a
 little electric motor. Little electric motors are also used for
 pumping water out of the canal. Both farms have garden-type tractors
 and no draft cattle.
 The main crops are rice, barley, wheat, mulberries, and cucumbers.
 Some of the mulberries are interplanted with vegetables and a little
 vetch. Both farms have little patches of tea as well as mushrooms.
 Our Tokyo guide says that these farmhouses are a bit below
 middle class but they look better than most I have seen today.
 We go on back to the cooperative. They have a fine storehouse
 here for rice and other crops with humidity and temperature controls
 and walls that are thoroughly rat proof.



K-2921. April 17, 1959. Japan. Near Konosu. People on nearby farm.



K-2919. April 17, 1959. Japan. Near Konosu. Small irrigation pump from canal.

K-2921. April 17, 1959. Japan. Near Konoan. People
on nearby farm.

K-2919. April 17, 1959. Japan. Near Konoan. Small
irrigation pump from canal.



K-2922. April 17, 1959. Japan. Near Konosu. Mushrooms are grown in pits on partially composted rice straw.



K-2924. April 17, 1959. Japan. Near Konosu. Cucumbers in beds.

K-5353. April 17, 1959. Japan. Near Konoan. Mushrooms
are grown in pits on partially composted rice straw.

K-5354. April 17, 1959. Japan. Near Konoan. Cucumbers
in beds.



K-2923. April 17, 1959. Japan. Near Konosu. Weeding mulberries interplanted with vetch.



K-2925. April 17, 1959. Japan. Near Konosu. Farm home.

K-2922. April 17, 1959. Japan. Near Konosu. Farm home.

K-2923. April 17, 1959. Japan. Near Konosu. Wooding.
mulberries interplanted with vetch.

We drive back toward Tokyo leaving our friends from the



K-2927. April 17, 1959. Japan. Near Konosu.
Mommy with our hosts.

years old. They must require an enormous amount of patience and
continual care. Although it is late I try to photograph some of
these. (K-2930-36)

We drive back toward Tokyo leaving our friends from the cooperative and then near the main road we leave the Mayor of Konosu and Mr. Masao Seyama of the prefecture office.

Mr. Aoki tells us that these farm people are very grateful for the land reforms pushed through by the Americans. The Ministry of Agriculture had been unable to make progress before. Now as owners, they have more income and are much happier. Hence their happy smiles at us today.

A little way north of Urawa I stop to photograph some pears (K-2928) trained in arbor form and a tea farm (K-2929).

On the way back to the city we drive off the road a bit to Bonsai Village. This is the most attractive place we have seen. Each family has a small holding surrounded by a high hedge mainly of cyprus. They specialize in the famous Bonsai or dwarf trees. We stop at one place and look at them. Some are as much as 400 years old. They must require an enormous amount of patience and continual care. Although it is late I try to photograph some of these. (K-2930-34)

We drive back toward Tokyo leaving our friends from the cooperative and then near the main road we leave the Mayor of Konosu and Mr. Masao Seyama of the prefecture office.

Mr. Aoki tells us that these farm people are very grateful for the land reforms pushed through by the Americans. The Ministry of Agriculture had been unable to make progress before. Now as owners, they have more income and are much happier. Hence their happy smiles at us today.

A little way north of Urawa I stop to photograph some pears (K-2928) trained in arbor form and a tea farm (K-2929).

On the way back to the city we drive off the road a bit to Bonsai Village. This is the most attractive place we have seen. Each family has a small holding surrounded by a high hedge mainly of cypress. They specialize in the famous Bonsai or dwarf trees. We stop at one place and look at them. Some are as much as 400 years old. They must require an enormous amount of patience and continual care. Although it is late I try to photograph some of these. (K-2930-34)



K-2928. April 17, 1959. Japan. Near Urawa. Pears trained on arbor with barley in foreground.



K-2929. April 17, 1959. Japan. Near Urawa. Tea garden with barley in foreground.

K-2928. April 17, 1959. Japan. Near Urawa. Pears trained on
arbor with barley in foreground.

K-2929. April 17, 1959. Japan. Near Urawa. Tea garden with barley
in foreground.



K-2930. April 17, 1959. Japan. Bonsai Village near Tokyo. Dwarf tree.



K-2931. April 17, 1959. Japan. Bonsai Village near Tokyo. Dwarf tree over 400 years old.

K-2930. April 17, 1959. Japan. Bonasai Village near
Tokyo. Dwarf tree.

K-2931. April 17, 1959. Japan. Bonasai Village near
Tokyo. Dwarf tree over 400 years old.



K-2932. April 17, 1959. Japan. Bonsai Village near Tokyo.
Dwarf tree.



K-2933. April 17, 1959. Japan. Bonsai Village near Tokyo.
Dwarf tree.

K-2932. April 17, 1959. Japan. Bonasai Village near Tokyo.
Dwarf tree.

K-2933. April 17, 1959. Japan. Bonasai Village near Tokyo.
Dwarf tree.



K-2934. April 17, 1959. Japan. Bonsai Village near Tokyo.
Dwarf tree.

K-2934. April 17, 1952. Japan. Bonasai Village near Tokyo.
Dwarf tree.

Still nearer the city I photograph seed beds for rice, including some from which the plastic covers have been removed. The plants are well up. (K-2935; K-2936)

We return to our hotel by way of Shiki. I am told that the Japanese do not name their streets. I should think this would be an awful nuisance. During the occupation the Americans named them and made a map but one sees these names on only a few main streets.

We reach the hotel about 6:00, have a fairly leisurely dinner, and are back in our room about 9:00.

Still nearer the city I photograph seed beds for rice, including some from which the plastic covers have been removed. The plants are well up. (K-2935; K-2936)

We return to our hotel by way of Shiki. I am told that the Japanese do not name their streets. I should think this would be an awful nuisance. During the occupation the Americans named them and made a map but one sees these names on only a few main streets.

We reach the hotel about 6:00, have a fairly leisurely dinner, and are back in our room about 9:00.



K-2935. April 17, 1959. Japan. Near Tokyo. Seed beds for rice with some already growing.

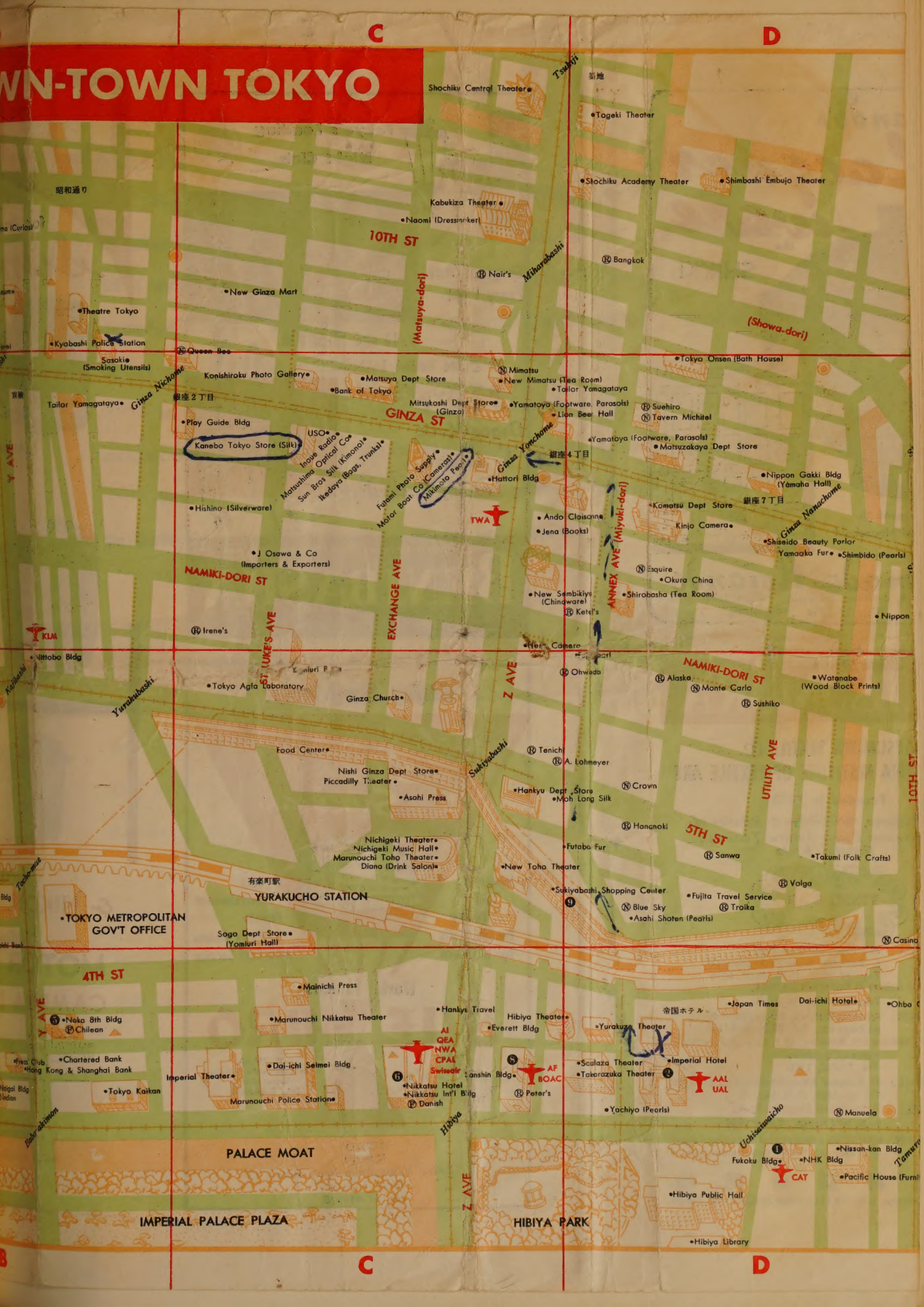


K-2936. April 17, 1959. Japan. Near Tokyo. Seed beds for rice with some already growing.

K-2935. April 17, 1959. Japan. Near Tokyo. Seed beds
for rice with some already growing.

K-2936. April 17, 1959. Japan. Near Tokyo. Seed beds
for rice with some already growing.

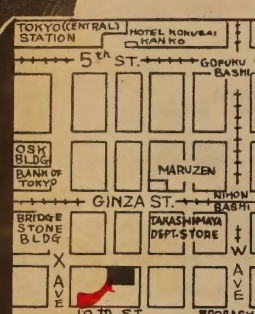
GINZA-TOWN TOKYO



ando's
Lacquerware
the
SHIKKI



ment to
Household



Canada Heiando
4, 3-chome Edobashi, Nihonbashi
TEL. 27-1724, 2794, 6774

TATSUMURA

TATSUMURA TEXTILE CO.
TATSUMURA INSTITUTE OF TEXTILE ART

Founded in 1895

Manufacturer, Wholesaler & Retailer of
Known Finest Artistic Textile in
Nishijin, Kyoto



CE: 2nd Floor, ORISHO Bldg.,
6, 2-chome, Nihombashi-Edobashi,
Tel. 27-0910, 4010, 4620, 6210
GALLERY in Korinkaku Mansion,
Takanawa. Tel. 44-0113

CE: Chiekoin Nishi-iru, Motoseiganji-dori,
Kamiko-ku. Tel. 44-0018, 6314

umura Silk Mansion, 43-1, Shimogawaracho,
Nanzenji, Sakyo-ku.
Tel. 7-1220, 1700

CE: 37, 3-chome, Kitakyutaromachi, Higashi-ku,
Tel. 25-2480, 2878, 6481/5

International Shopping Nook,
Kobe Int'l House. Tel. 2-1964

RE: MEITETSU International Shopping Center,
6th Floor, MEITETSU Department Store

村美術織物

lation with TATSUMURA SHOKO of Tokyo.

Tokyo's Leading
Night Club



Gorgeous Show
Every Night

9:40 and 10:50 P.M.

★ DON YADA DANCERS
★ Tokyo *Do L's

Dance Music
by Japan's
Leading Orchestras



Superb Chinese and French Cuisine

BENIBASHA

Tel: 48-8628/9 10th bet D & F

Enjoy Suehiro's

Fabulous Steaks Suki-yaki



Japanese Folk Dances Banquet Halls Bar & Tavern

Free Entertainment Private Party Rooms A la Cart Service

World Famous

SUE HIRO

TOKYO (OMORI)
Near Tokyo Int'l Air Port
Omori-Shinchi
Tel. 76-6766/8

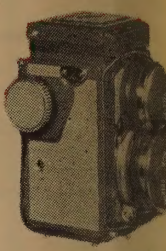
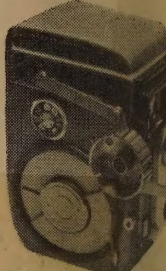
YOKOHAMA
Near Takarazuka Theater
Basha-michi
Tel. 8-6054/5

TOKYO (GINZA)
Behind Matsuzakaya Dept. Store
Ginza 6-chome
Tel. 57-9271/3

NO

for 8mm

Sun


& NIKON,

Distrib

MOTOR CAMERA

MATSUYA DEPT. STORE

2, 4-chom

(Next to Mi

Tel. 5

April 18

This morning I spend a long time getting a haircut, confirming our reservations home, and arranging for a tour tomorrow. If I ever stay again in Tokyo I should prefer a smaller, less crowded hotel. Then we take a short walk and are back to the hotel for a light lunch.

In the afternoon we take a long walk through the main shopping center but do not buy a great deal except for one scroll painting.

Shortly after we return to our room Mrs. Sherman Johnson calls. We have dinner with them and go to bed early.

This morning I spend a long time getting a haircut, con-

fixing our reservations home, and arranging for a tour tomorrow.

If I ever stay again in Tokyo I should prefer a smaller, less

crowded hotel. Then we take a short walk and are back to the

★ DON YADA DANCE★

In the afternoon we take a long walk through the main shopping

center but do not buy a great deal except for one scroll painting.

Shortly after we return to our room Mrs. Sherman Johnson calls.

We have dinner with them and go to bed early.

April 19 (Sunday)

I am up about 7:00 a.m. with a sore back. Today we planned a trip to Kamakura. We come down at 9:00 for the car but it doesn't come. The reception office calls the company and it seems that someone told them that we had canceled! But the car finally comes with an English speaking guide and we leave about 9:45.

Although the government offices are closed Saturday afternoon and Sunday, the stores are open on Sunday. The stores of each city district close one day each month.

We pass through Kawasaki - a rather dingy crowded area of light industry and poor homes. Then we drive through Yokohama and out into the harbor area. We go on to visit the Hachiman (Shinto) Shrine at Kamakura. There are great crowds of people here. (K-2938) Nearly everyone has at least one camera. All along the way up to the Shrine are many souvenir stalls. (K-2939) I see that the Japanese are as bad litter bugs as the Americans.

A heavily kimonoed bride is being led up the steps to her wedding in the Shrine. She will need to take her turn since a wedding is already in progress. (K-2940-2) We watch this for awhile and look briefly at the museum (K-2943) and then go over to see the Daidutsu (Great Buddha). K-2944-5) This is a huge bronze statue said to be 41.5 feet high and cast in 1192. Back of the statue are some more of the very nice Bonsai (or dwarf) trees. Here too, there are a great many people including picnicking families leaving lots of litter.

April 19 (Sunday)

I am up about 7:00 a.m. with a sore back. Today we planned

a trip to Kamakura. We come down at 9:00 for the car but it

doesn't come. The reception office calls the company and it

seems that someone told them that we had canceled! But the car

finally comes with an English speaking guide and we leave about

9:45.

Although the government offices are closed Saturday afternoon

and Sunday, the stores are open on Sunday. The stores of each city

district close one day each month.

We pass through Kawasaki - a rather dingy crowded area of light

industry and poor homes. Then we drive through Yokohama and out

into the harbor area. We go on to visit the Hachiman (Shinto)

Shrine at Kamakura. There are great crowds of people here. (K-2938)

Nearly everyone has at least one camera. All along the way up to

the Shrine are many souvenir stalls. (K-2939) I see that the

Japanese are as bad litter bugs as the Americans.

A heavily kimonoed bride is being led up the steps to her

wedding in the Shrine. She will need to take her turn since a

wedding is already in progress. (K-2940-2) We watch this for awhile

and look briefly at the museum (K-2943) and then go over to see the

Baldutsu (Great Buddha). (K-2944-5) This is a huge bronze statue

said to be 41.5 feet high and cast in 1192. Back of the statue

are some more of the very nice Bonsai (or dwarf) trees. Here too,

there are a great many people including picnicking families leaving

lots of litter.



K-2937. April 19, 1959. Japan. Near Kamakura.
Small farm.



K-2938. April 19, 1959. Japan. Kamakura. Smooth surfaced bridge (which few use) to Hachiman Shrine.



K-2939. April 19, 1959. Japan. Kamakura. One of the many stalls near Hachiman Shrine.

K-2938. April 19, 1959. Japan. Kamakura. Smooth surfaced bridge (which few use) to Hachiman Shrine.

K-2939. April 19, 1959. Japan. Kamakura. One of the many stairs near Hachiman Shrine.



K-2940. April 19, 1959. Japan. Kamakura.
Wedding in Hachiman Shrine.



K-2941. April 19, 1959. Japan. Kamakura.
Wedding in Hachiman Shrine. (Dancing girls.)

K-2940. April 19, 1959. Japan. Kamakura.
Wedding in Hachiman Shrine.

K-2941. April 19, 1959. Japan. Kamakura.
Wedding in Hachiman Shrine. (Dancing girls.)



K-2942. April 19, 1959. Japan. Kamakura.
Wedding in Hachiman Shrine.



K-2943. April 19, 1959. Japan. Kamakura.
Partial view of Hachiman Shrine area.

K-2912. April 19, 1959. Japan. Kamakura.
Wedding in Hachiman Shrine.

K-2913. April 19, 1959. Japan. Kamakura.
Partial view of Hachiman Shrine area.



K-2944. April 19, 1959. Japan. Kamakura.
Daidutsu (Great Buddha).



K-2945. April 19, 1959. Japan. Kamakura.
Daidutsu (Great Buddha).

K-2944. April 19, 1959. Japan. Kamakura.
Daibutsu (Great Buddha).

K-2945. April 19, 1959. Japan. Kamakura.
Daibutsu (Great Buddha).

We drive to the Enoshima Hotel for a light lunch, which is served very slowly. About two we drive back to Tokyo by a somewhat different route and are in our hotel at 4:00 p.m. Then rest, notes, dinner, a short walk, and ready for bed.

We drive to the Enoshima Hotel for a light lunch, which is served very slowly. About two we drive back to Tokyo by a somewhat different route and are in our hotel at 4:00 p.m. Then rest, notes, dinner, a short walk, and ready for bed.

April 20 (a)

At their request I call on the Agricultural Attacheⁱ and his assistant, Mr. Motz, at the American Embassy. They seem to be busy with reports and interviews and to have nothing especially in mind so I stay only a few minutes.

Mommy finishes the customs declaration and I the rough draft of a speech. We have our lunch and start to walk but the rain is too much and we return to the hotel, rest, start our packing, and go for tea.

The rain lets up and we take a long walk in the city. Then dinner, pay our bills, and finish packing.

We leave the hotel for the airport at 10:15 p.m. We check in through stages and board the plane. The motors warm up as one day passes to another. We are slow in starting. Finally the wheels leave the ground at 12:30 a.m.

(Note: Except for the profile descriptions on April 21, the notes until the evening of April 22 are from memory the morning of April 23. Again I somehow lost a notebook! Fortunately I had copied out a part.)

April 20 (a)

At their request I call on the Agricultural Attache and his assistant, Mr. Mox, at the American Embassy. They seem to be busy with reports and interviews and to have nothing especially in mind so I stay only a few minutes.

Mommy finishes the customs declaration and I the rough draft of a speech. We have our lunch and start to walk but the rain is too much and we return to the hotel, rest, start our packing, and go for tea.

The rain lets up and we take a long walk in the city. Then

dinner, pay our bills, and finish packing.

We leave the hotel for the airport at 10:15 p.m. We check in through stages and board the plane. The motors warm up as one day passes to another. We are slow in starting. Finally the wheels leave the ground at 12:30 a.m.

(Note: Except for the profile descriptions on April 21, the

notes until the evening of April 22 are from memory the morning of April 23. Again I somehow lost a notebook! Fortunately I had copied out a part.)

April 20 (b)

Actually this is April 21 but we shall soon cross the date line and be back to April 20 again. I go to bed at 1:10 a.m. and have a good sleep until 7:00 a.m., which is 12 noon by Honolulu time.

The flight is pleasant and we are down in Honolulu at 5:00 p.m., about 30 minutes late. Then we have quite a wait for customs. But when our turn comes everything is very easy despite our long list. Nothing is looked at and we go through. Mr. J. H. Christ, Territorial Conservationist, and Mr. J. Melvin Williams, Territorial Soil Scientist, meet us with leis and take us to the Princess Kaiulani Hotel. We change, have dinner, and are soon to bed.

April 20 (b)

Actually this is April 21 but we shall soon cross the date

line and be back to April 20 again. I go to bed at 1:10 a.m.

and have a good sleep until 7:00 a.m., which is 12 noon by

Honolulu time. Only a few minutes.

The flight is pleasant and we are down in Honolulu at 5:00 p.m.,

about 30 minutes late. Then we have quite a wait for customs. But

when our turn comes everything is very easy despite our long list.

Nothing is looked at and we go through. Mr. J. H. Christ, Terri-

torial Conservationist, and Mr. J. Melvin Williams, Textile

Soil Scientist, meet us with leis and take us to the Princess

Kaunani Hotel. We change, have dinner, and are soon to bed.

The night is very quiet and pleasant. The hotel is very

pleasant to me. We are now in Hawaii. Finally the

island is reached at 11:30 a.m.

(Note: Change for the previous description on April 21, 1941)

and until the evening of April 22 we have enjoyed the

at April 22. Again I mention that a mistake was made

and a page was

April 21

I leave at 8:00 with Mel Williams and go to the office, then drop my last 10 rolls of kodachrome for developing. We drive out to the University and pick up Dr. Sherman and go to the field to look at a soil on the Ewa Sugar Plantation. Here I meet the soil survey party chief for Oahu, Mr. Duke Womack and his GS-5 assistant, Mr. Saku Nakamura.

The pit has been dug. Then comes Mr. Sparrow of the Ewa plantation.

Honouliuli clay: In the old soil survey this was included as one of the dry members of the "hydromorphic Latosols". I should now call it a rather dark Alluvial-Reddish-Brown Latosol intergrade. There is no mottling or other evidence of gleying. The rainfall is said to be 15 to 20 inches and the elevation some 80 feet. The surface is nearly level and suggests a deltaic alluvial plain with some re-worked volcanic ash.

- | | | |
|----------------|---------|--|
| A _p | 0 - 7" | (Uneven surface from ridging). Very dark reddish-brown (5YR 2/1.5 clay; medium blocky with fine granular margins on peds; firm; many root holes; a few small manganese concretions. |
| B | 7 - 58" | Nearly massive dark reddish-brown (5YR 3/2) clay. The soil digs out in poor angular blocky; plastic when moist but somewhat friable and rolls into coarse threads; many fine and very fine continuous pores; some glossy pressure surfaces on weakly developed peds; some small Mn concretions. The lower boundary is gradual. This horizon could be quite arbitrarily subdivided. |

April 21

I leave at 8:00 with Mel Williams and go to the office, then drop my last 10 rolls of Kodachrome for developing. We drive out to the University and pick up Dr. Sherman and go to the field to look at a soil on the Ewa Sugar Plantation. Here I meet the soil survey party chief for Oahu, Mr. Duke Womack and his GS-2 assistant, Mr. Saku Nakamura.

The pit has been dug. Then comes Mr. Sparrow of the Ewa plantation.

Honouliuli clay: In the old soil survey this was included as one of the dry members of the "hydromorphic Latosols". I should now call it a rather dark Alluvial-Reddish-Brown Latosol intergrade. There is no mottling or other evidence of gleying. The rainfall is said to be 15 to 20 inches and the elevation some 80 feet. The surface is nearly level and suggests a delicate alluvial plain with some re-worked volcanic ash.

- A_p 0 - 7" (Uneven surface from ridging). Very dark reddish-brown (2YR 2/1.5 clay; medium blocky with fine granular margins on beds; firm; many root holes; a few small manganese concretions.
- B 7 - 28" Nearly massive dark reddish-brown (2YR 3/2) clay. The soil digs out in poor angular blocky; plastic when moist but somewhat friable and rolls into coarse threads; many fine and very fine con-
nuous pores; some glossy pressure surfaces on weakly developed beds; some small Mn concretions. The lower boundary is gradual. This horizon could be quite arbitrarily subdivided.

C 58 - 65+ Dark reddish-brown (5YR 3/2) clay, much like the above but more friable. Removed clods break into medium and small angular blocky with shiny pressure surfaces or faces. The soil is quite friable and not so plastic. Some small Mn concretions.

The roots go down to about 48".

The soil is used for irrigated sugarcane.

While the boys finish, Mr. Sparrow drives over to see current harvesting of sugarcane. They use a bulldozer with 2 deep prongs and several shallower ones to push the cane into windrows. (K-2946-7) This is picked up by large cranes and put into the huge racks of large trucks for hauling to the mill. (K-2948-9) Much soil adheres to the cane. At the mill the cane first goes through a washing plant to remove the soil. This material in suspension is guided out over thin soil to deepen it.

Then we return to the University to drop Dr. Sherman. Plans are made for him to pick me up at the hotel next Friday morning. Williams and I have lunch and then go back to the field to see a deep pit in Molaiki silty clay loam.

Molaiki silty clay loam, grouped with the Low Humic Latosols in the old soil survey, is exposed at the margin of a sugarcane field. Now, I should call it a Reddish-Brown Latosol from basalt. The surface is undulating. A few roundish basaltic boulders may be seen. These have a weathered crust rich in olivene. The rainfall is about 23 to 25 inches and the elevation about 480 feet. The surface has been stirred to 20 inches and is very irregular from ridging.

Dark reddish-brown (2YR 3/2) clay, much like the above but more friable. Removed clods break into medium and small angular blocks with shiny pressure surfaces or faces. The soil is quite friable and not so plastic. Some small Mn concretions.

The roots go down to about 48".

The soil is used for irrigated sugarcane.

While the boys finish, Mr. Sparrow drives over to see current

harvesting of sugarcane. They use a bulldozer with 2 deep prongs

and several shallower ones to push the cane into windrows. (K-2948-7)

This is picked up by large cranes and put into the huge racks of large

trucks for hauling to the mill. (K-2948-9) Much soil adheres to the

cane. At the mill the cane first goes through a washing plant to

remove the soil. This material in suspension is guided out over thin

soil to deepen it.

Then we return to the University to drop Dr. Sherman. Plans are

made for him to pick me up at the hotel next Friday morning. Williams

and I have lunch and then go back to the field to see a deep pit in

Molaiski silty clay loam.

Molaiski silty clay loam, grouped with the low Humic Latosols in

the old soil survey, is exposed at the margin of a sugarcane field.

Now, I should call it a Reddish-Brown Latosol from basalt. The

surface is undulating. A few rounded basaltic boulders may be seen.

These have a weathered crust rich in olivine. The rainfall is about

23 to 25 inches and the elevation about 480 feet. The surface has

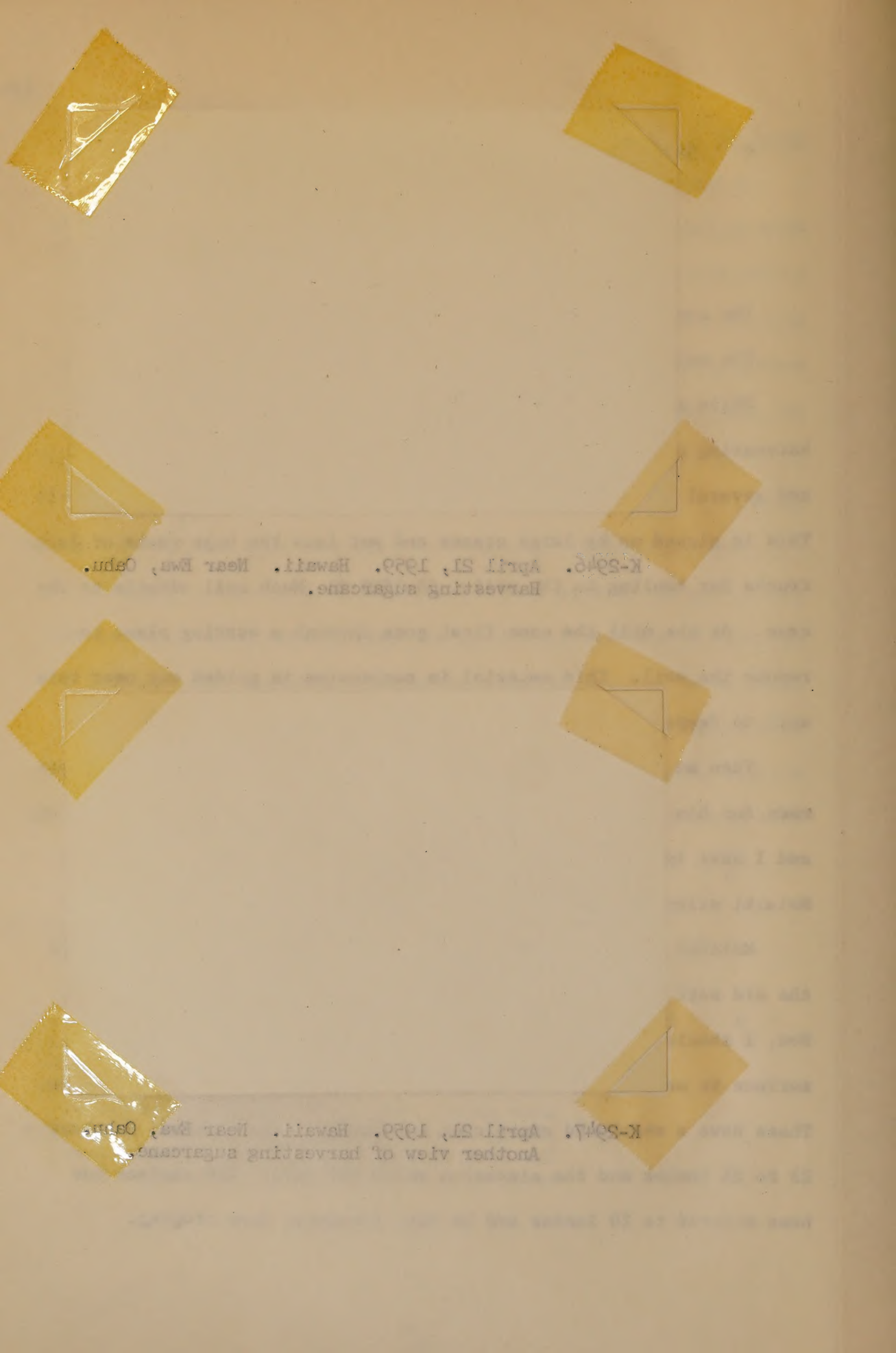
been stirred to 20 inches and is very irregular from ridging.



K-2946. April 21, 1959. Hawaii. Near Ewa, Oahu.
Harvesting sugarcane.



K-2947. April 21, 1959. Hawaii. Near Ewa, Oahu.
Another view of harvesting sugarcane.



K-2946. April 21, 1959. Hawaii. Near Ewa, Oahu.
Harvesting sugarcane.

K-2947. April 21, 1959. Hawaii. Near Ewa, Oahu.
Another view of harvesting sugarcane.



K-2948. April 21, 1959. Hawaii. Near Ewa, Oahu.
Loading cane in the field.



K-2949. April 21, 1959. Hawaii. Near Ewa, Oahu.
Another view of loading cane in the field.

K-2948. April 21, 1959. Hawaii. Near Ewa, Oahu.
Loading cane in the field.

K-2949. April 21, 1959. Hawaii. Near Ewa, Oahu.
Another view of loading cane in the field.

- | | | |
|---------------------|----------|--|
| A _p | 0 - 9" | Dark reddish-brown (10R 3/3) silty clay loam or light clay. The soil digs out in clods that are very easily friable to soft fine crumb. Plastic when rubbed but not sticky. |
| A-B _p | 9 - 20" | A streaked mixture of A and B with an abrupt wavy boundary. |
| B | 20 - 49" | Dark reddish-brown to yellowish-red (10R 3/6) silty clay loam to clay; massive in place but large chunks break into medium and fine sub-angular, irregular blocky with slight films of oxides (?) on the ped surfaces. These peds are easily friable to soft fine granular. There are fine, continuous pores and root holes; some small manganese concretions. It seems that the lower part has slightly more clay and the horizon could be divided into 3 nearly equal parts. Gradual, wavy boundary. |
| B ₃ or C | 49 - 65" | Dark yellowish-red to reddish brown (10R 3/6) clay loam. This soil is somewhat more sticky and a bit lighter in color and texture than that just above it. |

At various depths, the profile may be interrupted with small to huge rounded basaltic boulders with abundant olivine in the weathering shell. Where not interrupted the roots go to about 48 inches.

This soil is now used also for irrigated sugarcane.

After we finish filling in the hole, I am a bit tired. We drive back to the hotel a bit after 6. Then I change and we go out for a steak dinner with Don the Beachcomber.

steak dinner with Don the Beachcomber.

back to the hotel a bit after 6. Then I change and we go out for a

After we finish filling in the hole, I am a bit tired. We drive

This soil is now used also for irrigated sugarcane.

shell. Where not interrupted the roots go to about 48 inches.

huge rounded basaltic boulders with abundant olivine in the weathering

At various depths, the profile may be interrupted with small to

that just above it.

and a bit lighter in color and texture than

clay loam. This soil is somewhat more sticky

Dark yellowish-red to reddish brown (10R 3/6)

boundary.

into 3 nearly equal parts. Gradual, wavy

more clay and the horizon could be divided

It seems that the lower part has slightly

root holes; some small manganese concretions.

lar. There are fine, continuous pores and

beds are easily friable to soft fine granu-

of oxides (?) on the bed surfaces. These

angular, irregular blocky with slight films

large chunks break into medium and fine sub-

silty clay loam to clay; massive in place but

Dark reddish-brown to yellowish-red (10R 3/6)

boundary.

A streaked mixture of A and B with an abrupt

not sticky.

soft fine crumb. Plastic when rubbed but

in clods that are very easily friable to

loam or light clay. The soil digs out

Dark reddish-brown (10R 3/3) silty clay

A_p

0 - 9"

A-B_p

9 - 20"

B

20 - 49"

B₃ or C 49 - 62"

April 22

Mel Williams comes about 8:00 a.m. and we drive out to the Ewa plantation to look at the Waipahu silty clay, not far from the sea under low rainfall. This appears to be possibly the weakly dissected remnant of an old marine terrace, perhaps with some ash on the surface. Where the pit is made the slope is only very gentle. The soil is used for irrigated sugarcane. (K-2950)

The dark brown surface soil to 8 or 10 inches is quite granular. Beneath is an A-B_p some 10 inches thick, which is a mixture of the surface with the B, in streaks. Both of these contain a good deal of rather soft Mn concretions. The soil beneath to 48 inches is heavy clay, massive and compact in place. Removed clods show some irregular blocky, with Mn accretions along some ped surfaces, especially in the upper part. Roots go down to about 45 inches. The material has some fine pores but is only slowly permeable.

Beneath is mottled clay - brown, reddish-brown, and yellowish-brown. The material is generally massive, but does show some weak, coarse platy structure. This is probably a B₃ of very slow permeability. Water stands in the pit just above it as a perched water table.

Then we drive some distance, through Wahiawa to see the Manana silty clay in an old pineapple field now growing up to grasses and weeds after about 5 years abandonment. This is a red, two-story profile.

April 22

Mel Williams comes about 8:00 a.m. and we drive out to the

Ewa plantation to look at the Waipahu silty clay, not far from

the sea under low rainfall. This appears to be possibly the

weakly dissected remnant of an old marine terrace, perhaps with

some ash on the surface. Where the pit is made the slope is only

very gentle. The soil is used for irrigated sugarcane. (K-2920)

The dark brown surface soil to 8 or 10 inches is quite granular.

Beneath is an A-B₂ some 10 inches thick, which is a mixture of the

surface with the B₁ in streaks. Both of these contain a good deal

of rather soft Mn concretions. The soil beneath to 48 inches is

heavy clay, massive and compact in place. Removed clods show some

irregular blocky, with Mn accretions along some ped surfaces,

especially in the upper part. Roots go down to about 45 inches.

The material has some fine pores but is only slowly permeable.

Beneath is mottled clay - brown, reddish-brown, and yellowish-

brown. The material is generally massive, but does show some weak,

coarse platy structure. This is probably a B₃ of very slow permea-

bility. Water stands in the pit just above it as a perched water

table.

Then we drive some distance, through Wahiawa to see the Manana

silty clay in an old pineapple field now growing up to grasses and

weeds after about 5 years abandonment. This is a red, two-story

profile.

(Field notes 4/22/59)
From M. Williams

WAIPAHU SERIES

Location: Along Farrington Highway 0.4 mile west of Farrington Highway and Kunia road junction. Pit was 50 feet to south of road in cane field.

Classification: Low Humic Latosol.

Parent Material: Moderately fine textural alluvium washed from adjacent upland soils developed from residuum derived from basic igneous rock.

Climate: 25 inches rainfall, most of which falls from September through March. Irrigated for cane.

Vegetation: Irrigated cane.

Physiography: Gently sloping old alluvial terrace. Slope 2% to south.

Elevation: 230 feet.

Drainage: Moderately well drained. Permeability of A and B moderately rapid; of D(?), slow. Surface run-off moderately slow.

Remarks: Pit was excavated on Monday and dug to only 40 inches because of water table at a 36-inch depth. Water turned off Monday noon. Water table still in pit on Wednesday morning.

Soil Profile: Waipahu silty clay^{1/}

A_p 0-13" Very dark grayish-brown (10YR 3/2) clay that feels like silty clay with some mixing of dark brown (10YR 3/3) by tillage, dark grayish brown (10YR 4/2) when dry; cloddy breaking to weak fine and medium granular; sticky, very plastic, friable; few fine roots; common very fine and fine interstitial pores; many very fine pyrolusite concretions; strong effervescence with hydrogen peroxide; clear wavy boundary. 11 to 14 inches thick.

B_p 13-21" Dark-brown (10YR 3/3) clay that feels like silty clay with some mixing of very dark grayish brown in the upper horizon by cultivation; weak fine and medium subangular blocky structure; sticky, plastic, friable; few fine roots; common very fine and fine tubular pores; many black pyrolusite flakes and concretions; strong effervescence with hydrogen peroxide; clear wavy boundary. 7 to 11 inches thick.

^{1/} Although the soil material in the solum is probably clay, it has the consistence and behavior of a silty clay. In Hawaii soil type names are assigned according to apparent texture.

- B₂₁ 21-37" Dark-brown (7.5YR 3/2) clay that feels like clay loam, many black coatings on ped surfaces; moderate very fine and fine subangular blocky structure; sticky, plastic, friable; few fine roots; many very fine and fine tubular pores; many pyrolusite concretions of 1 to 5 mm.; moderate effervescence with hydrogen peroxide--violent effervescence on pyrolusite concretions--few patchy glaze coatings on ped surfaces; clear wavy boundary. 12 to 15 inches thick.
- B₂₂ 37-43" Dark-brown (7.5YR 3/4) clay that feels like clay loam with coarse distinct mottles of dark reddish brown; moderate very fine and fine subangular blocky structure; sticky, plastic, friable; occasional fine roots; many very fine and fine tubular pores; few fine black pyrolusite concretions; effervescence with hydrogen peroxide only on pyrolusite concretions; many fine yellowish sand grains; abrupt smooth boundary. 7 to 10 inches thick.
- D(?) or (B₃) 43-54+" Dark-brown (7.5YR 3/2) clay that feels like silty clay highly mottled with coarse distinct mottles of very dark gray (5YR 3/1), dark reddish brown (5YR 3/4) and 2.5YR 3/4; massive; sticky, very plastic, friable; no visible pores; no effervescence with hydrogen peroxide.

NOTE: This layer appears to be holding up the water table. From studies made of the geology of the area, this horizon conforms to a floor of an old marine deposit at a higher stand of the ocean.



K-2950. April 22, 1959. Hawaii. Near Ewa, Oahu.
Close view of irrigation layout.

MANANA SERIES

(59Ha7-14-1 through 5)

Location: 1.8 miles northeast of the Kanehameha Highway and Wahiawa Naval Radio road junction. Sample pit was 200 feet east of macadam road leading to the Naval Radio Station. Site approximately 2 miles northeast of Wahiawa.

Classification: Humic Ferruginous Latosol intergrading toward a less weathered Latosol.

Parent Material: Apparently developed from a thin mantle of ash which lies unconformably over soil material developed in place from residuum derived from basic igneous rock.

Vegetation: Area cultivated - now abandoned pineapple field.

Climate: 70-80 inches rainfall with a short dry season each summer of a duration of 1 to 2 months.

Elevation: 1140 feet.

Physiography: Gently sloping to rolling intermediate leeward slopes of the Koolau range. Sample site was 5% to southwest.

Drainage: Well drained. Permeability of material believed derived from ash is moderately rapid. Permeability of unconforming subsoil is moderately slow. Run-off is moderate.

Remarks: Soil was indicated in published report as being developed from residuum derived from basic igneous rock. It is apparent to me that top mantle is derived from ash. Samples pulled for Dr. Sherman (University of Hawaii) and correlation.

Soil Profile: Manana silty clay^{1/}

A_p 0-13" Dark reddish-brown (2.5YR 2/4) clay that feels like silty clay, mixed with dark red (10R 3/6) by cultivation, reddish brown (2.5YR 4/4) when dry; weak fine subangular blocky structure; sticky, plastic, friable, hard; common roots; many very fine and fine tubular pores; many very fine specks of glistening material; effervescence with hydrogen peroxide slight; few soft pyrolusite concretions; abrupt smooth boundary. 12 to 15 inches thick.

^{1/} Although the soil material in the solum is probably clay, it has the consistence and behavior of a silty clay. In Hawaii soil type names are assigned according to apparent texture.

Manana Series (continued)

- B₂ 13-18" Dark-red (10R 3/6 moist) clay that feels like silty clay with slight mixing in upper part with dark reddish brown (2.5YR 4/4) by cultivation; weak very fine and fine subangular blocky structure; sticky, very plastic, friable; few fine roots; common very fine and fine tubular pores; common fine patchy glaze on ped surfaces of slightly darker value; abrupt smooth boundary. 2 to 6 inches thick.
59Ha7-14-2
- D₁ or 18-41" Dark-red (2.5YR 3/6 moist) clay with coatings on ped faces and (B_{2b}) in pores of dark red (10R 3/6) and red (10R 4/5); strong very fine subangular blocky and blocky structure; sticky, very plastic, firm and compact in place; no roots; common very fine and fine tubular pores; continuous glaze on ped surfaces of redder hue. The horizon is bounded on the top by a distinct, abrupt layer 1 to 3 mm. thick of a compact firmer material. This layer may have been caused by hot ash falling on an old soil. Clear wavy boundary. 20 to 24 inches thick.
59Ha7-14-3
- D₂ or 41-59" Dark reddish-brown (5YR 3/3 moist) clay with coatings of dark (B_{2b}) red (10R 3/6) and red (10R 4/6) on ped surfaces; strong very fine subangular and angular blocky structure; sticky, very plastic, firm, and compact in place; no roots; common very fine and few fine tubular pores; continuous thick coating on ped surfaces of redder hue; gradual wavy boundary. 16 to 22 inches thick.
59Ha7-14-4
- D₃ or 59-65+" Dark reddish-brown (5YR 3/3 moist) clay with coatings of ped (B_{3b}) surfaces of dark red (2.5YR 3/6 and 10R 3/6); moderate very fine and fine subangular blocky structure; sticky, plastic, firm; slightly less compact in place; no roots; common very fine and fine and few fine tubular pores; continuous glaze on ped surfaces of redder hue; many soft, highly weathered rock fragments.
59Ha7-14-5



K-2951. April 22, 1959. Hawaii. Near Waialua, Oahu.
Pond and irrigation layout for sugarcane.

The A_p of some 8 to 10 inches is highly granular (crumb) and overlies a red B, some 8 to 10 inches thick. The soil digs out in chunks that are easily friable to granular (crumb). The lower boundary is very sharp. The soil beneath for some 50 inches is compact and massive in place but digs out in clods that fall into medium and small angular blocky. But the soil is so compact in place that permeability is slow and the soil above is highly erosive unless carefully managed. At around 50 inches, the soil is less compact and digs out easily into fragments that fall into strong angular medium and fine blocky.

We go to lunch at Wahiawa and return for collecting samples. Later we drive in the direction of Waialua and look at the pineapples and at soil being prepared for irrigated sugarcane. (K-2951)

We return to the office about 4:30 and I then go to pick up my kodachromes from the end of the Assam trip to last Sunday. Many are excellent.

Then Mr. Williams takes me back to the hotel. After I bathe and change I cannot find my notebook! I call Williams but he says it is not in the car. So I've lost my profile descriptions of today.

Mommy and I walk out for dinner and some window shopping. Then we work on old notes and get to bed about 10:30.

The A_p of some 8 to 10 inches is highly granular (crumb) and overlies a red B, some 8 to 10 inches thick. The soil digs out in chunks that are easily friable to granular (crumb). The lower boundary is very sharp. The soil beneath for some 50 inches is compact and massive in place but digs out in clods that fall into medium and small angular blocky. But the soil is so compact in place that permeability is slow and the soil above is highly erosive unless carefully managed. At around 50 inches, the soil is less compact and digs out easily into fragments that fall into strong angular medium and fine blocky.

We go to lunch at Wahawa and return for collecting samples. Later we drive in the direction of Waiata and look at the pineapples and at soil being prepared for irrigated sugarcane. (K-2921)

We return to the office about 4:30 and I then go to pick up my kodachromes from the end of the Assam trip to last Sunday. Many are excellent.

Then Mr. Williams takes me back to the hotel. After I bathe and change I cannot find my notebook! I call Williams but he says it is not in the car. So I've lost my profile descriptions of today. Mommy and I walk out for dinner and some window shopping. Then we work on old notes and get to bed about 10:30.

April 23

After breakfast we call the kodak place but they have not seen any notebook. About 9:15 I go out there and to our office, but no notebook. Then I return to the hotel for lunch, notes, and outlining a speech.

About 2 p.m. I go with Heine Christ to the headquarters of the Hawaiian Sugar Planters Association. I give a well-attended lecture on Shifting cultivation. After some chit-chat with some of the people I've known I return to the hotel about 4:40. Then dinner, notes, and to bed.

April 23

After breakfast we call the Kodak place but they have not

seen any notebook. About 9:15 I go out there and to our office.

but no notebook. Then I return to the hotel for lunch, notes,

and outlining a speech.

About 2 p.m. I go with Heine Christ to the headquarters of

the Hawaiian Sugar Planters Association. I give a well-attended

lecture on Shifting cultivation. After some chit-chat with some

of the people I've known I return to the hotel about 4:40. Then

dinner, notes, and to bed.

April 24

In the morning I write out a draft of a short speech for tomorrow night.

Don Sherman calls about 8:30 and Mommy and I go with him for a trip, first over the Pali Road. He says there are big bauxite deposits in the valley up to the pass but no one wants the land here dug up for it. Sherman says that most bauxite deposits are from the late lava flows of less than 40 percent silica. Some have weathered rapidly down to less than one percent silica.

We go over the Pali, meet Mr. Womack and Mr. Nakamura, and drive out to a pit near Waimanalo. (Unhappily someone has partially filled it with rubbish.)

The pit is in Waimanalo clay. Here the rainfall is about 35 to 40 inches and the elevation 80 feet. This very gently undulating valley was once probably a marine inlet. The solum appears to be from alluvium along with some mixture of ash. Some pebbles and stones of pumice, now highly weathered, suggest that some explosive material may have been dropped here in shallow water. The seepage water is said to be rich in manganese. Unhappily this soil was grouped in the old soil survey with "Low Humic Latosols". I should now think of it as a three-way intergrade among Reddish-Brown Latosol, gleyed Reddish-Brown Latosol, and Tropical Black Clay.

April 24

In the morning I write out a draft of a short speech for

tomorrow night.

Don Sherman calls about 8:30 and Mommy and I go with him

for a trip, first over the Pali Road. He says there are big

bauxite deposits in the valley up to the pass but no one wants

the land here dug up for it. Sherman says that most bauxite

deposits are from the late lava flows of less than 40 percent

silica. Some have weathered rapidly down to less than one percent

silica.

We go over the Pali, meet Mr. Womack and Mr. Nakamura, and

drive out to a pit near Waimanalo. (Unhappily someone has partially

filled it with rubbish.)

The pit is in Waimanalo clay. Here the rainfall is about 35 to

40 inches and the elevation 80 feet. This very gently undulating

valley was once probably a marine inlet. The solum appears to be

from alluvium along with some mixture of ash. Some pebbles and

stones of pumice, now highly weathered, suggest that some explosive

material may have been dropped here in shallow water. The seepage

water is said to be rich in manganese. Unhappily this soil was grouped

in the old survey with "Low Humic Latosols". I should now think

of it as a three-way intergrade among Reddish-Brown Latosol, gleyed

Reddish-Brown Latosol, and Tropical Black Clay.

The pit is in a nearly level abandoned sugarcane field, now grown up to weeds and grass. It is ill-drained during the more moist months.

- | | | |
|-----------------|-----------|---|
| A _p | 0 - 8" | Almost black (5YR 2/1.2) clay. The soil breaks out in weak, medium to coarse, irregular, partly subangular blocky that is easily friable to medium granular (crumb) when moist. The soil is firm to hard when dry; many roundish medium granules on the sides of the peds; some medium and large pores, including worm holes and root holes; a few Mn concretions; gradual boundary. This horizon begins to approach the A ₁ of a Tropical Black Clay. |
| B ₂ | 8 - 28" | Very dark brown (5YR 3/2) clay; sticky when wet and firm to hard when dry. Clods are easily broken into weak, medium irregular blocky peds that are easily friable when moist; some medium and coarse pores. I see no concretions but there are scattered pebbles of weathered pumice; fairly clear wavy boundary. |
| B ₃₁ | 28 - 38" | Transitional; gradual boundary. |
| B ₃₂ | 38 - 50+" | Dark reddish-brown silty clay, mottled with shades and with reddish brown, mostly in streaks. The soil is nearly massive but removed clods fall into weak small irregular blocky that is fairly easily friable when moist. I see some evidence of Mn accretions; some weathered pebbles and small stones of pumice and basalt. With depth, the soil becomes a bit more brown and yellowish brown and less reddish brown. |

Now this soil is used mainly for tomatoes, melons, onions, sweet-corn, sweetpotatoes, passion fruit, papaya, and bananas. The area is a bit too windy for trees. Many need to use windbreaks.

Dr. Sherman then drives around the island to Wailua. We stop at Wahiawa for lunch and return to the hotel about 3:00 p.m. after a pleasant day.

pleasant day.

Wahlawa for lunch and return to the hotel about 3:00 p.m. after a

Dr. Sherman then drives around the island to Wailua. We stop at

pit too windy for trees. Many need to use windbreaks.

corn, sweetpotatoes, passion fruit, papaya, and bananas. The area is a

Now this soil is used mainly for tomatoes, melons, onions, sweet-

and less reddish brown.

becomes a bit more brown and yellowish brown

pumice and basalt. With depth, the soil

some weathered pebbles and small stones of

moist. I see some evidence of Mn accretions;

blocky that is fairly easily friable when

removed clods fall into weak small irregular

streaks. The soil is nearly massive but

shades and with reddish brown, mostly in

Dark reddish-brown silty clay, mottled with

Transitional; gradual boundary.

of weathered pumice; fairly clear wavy boundary.

moist; some medium and coarse pores. I see

blocky peds that are easily friable when

easily broken into weak, medium irregular

wet and firm to hard when dry. Clods are

Very dark brown (2YR 3/2) clay; sticky when

Tropical Black Clay.

This horizon begins to approach the A₁ of a

holes; a few Mn concretions; gradual boundary.

large pores, including worm holes and root

on the sides of the peds; some medium and

hard when dry; many roundish medium granules

(crumb) when moist. The soil is firm to

is easily friable to medium granular

irregular, partly subangular blocky that

breaks out in weak, medium to coarse,

Almost black (2YR 2/1.2) clay. The soil

moist months.

grown up to weeds and grass. It is ill-drained during the more

The pit is in a nearly level abandoned sugarcane field, now

About 4:00 p.m. Mr. F. Nunns calls and we talk about some of the problems involved in land classification here. I stress the importance of more attention to both land and water law in this work.

Dinner, a short walk, and to bed.

April 25

After breakfast I finish my speech for the Hawaiian Academy of Science and Mommy types it. About 9:30 we go out to the Bishop Museum. On the way back we stop in the city for lunch and shopping. In the afternoon we pack up another bundle to mail home.

About 6:00 p.m. Mr. and Mrs. Christ come to the hotel and take us to the Hawaiian Village Hotel for the annual banquet of the Hawaiian Academy of Science.

Early in the evening I am called on for my brief speech during which I talk for six or seven minutes on the food problem in underdeveloped countries. Then we have a speech by Governor Quinn in which he tries to prove all that he is doing for science (unconvincingly) and an over-long speech by the retiring President of the Academy on its history.

We are back to the hotel about 10:00.

My talk at the Academy:

During the past few years, I have had to be concerned with food production in other countries besides our own. In many underdeveloped countries population is growing faster than resource development for food. This is not because of any general lack of soil resources; it is because public health measures and the stimulation of desires for better living went far ahead of scientific research and development of agriculture. If all soils in the world that are suitable for food crops were used as efficiently as those in Holland, for example, world population could be several times the present number.

April 25

After breakfast I finish my speech for the Hawaiian Academy of Science and Mommy types it. About 9:30 we go out to the Bishop Museum. On the way back we stop in the city for lunch and shopping. In the afternoon we pack up another bundle to mail home.

About 6:00 p.m. Mr. and Mrs. Christ come to the hotel and take us to the Hawaiian Village Hotel for the annual banquet of the Hawaiian Academy of Science.

Early in the evening I am called on for my brief speech during which I talk for six or seven minutes on the food problem in underdeveloped countries. Then we have a speech by Governor Quinn in which he tries to prove all that he is doing for science (unconvincingly) and an ever-long speech by the retiring President of the Academy on its history.

We are back to the hotel about 10:00.

My talk at the Academy:

During the past few years, I have had to be concerned with food production in other countries besides our own. In many underdeveloped countries population is growing faster than resource development for food. This is not because of any general lack of soil resources; it is because public health measures and the stimulation of desires for better living went far ahead of scientific research and development of agriculture. If all soils in the world that are suitable for food crops were used as efficiently as those in Holland, for example, world population could be several times the present number.

Then too, in many countries the food situation is no worse than it ever was. But recently people have heard about the abundance in the United States and are more conscious of their own situation than before.

But in the underdeveloped countries the agriculturist faces several serious handicaps:

- (1) Low social status of farm people, even including professional agriculturists;
- (2) Low political standing of agriculture;
- (3) Lack of machines, chemicals, and transport;
- (4) Lack of basic data, especially about the soil resources.

After all, we cannot transfer agricultural practices from one kind of soil to a contrasting one in a different social organization. We can transfer only basic principles and the skills to learn. Most of the actual techniques of soil use and conservation must be invented on the spot to fit the local kinds of soil and social systems. Usually changes in these systems can be made only slowly.

Somehow many of the key people responsible for food production in these countries, including some of their American and European advisors, assume that agriculture is relatively simple. They assume that "someone" knows what are the best practices. It is only necessary to find this "someone", to have him explain them, and to set up an extension program to carry the good word to the cultivators.

Then too, in many countries the food situation is no worse

than it ever was. But recently people have heard about the

abundance in the United States and are more conscious of their

own situation than before.

But in the underdeveloped countries the agriculturalist faces

several serious handicaps:

(1) Low social status of farm people, even including professional

agriculturalists;

(2) Low political standing of agriculture;

(3) Lack of machines, chemicals, and transport;

(4) Lack of basic data, especially about the soil resources.

After all, we cannot transfer agricultural practices from one

kind of soil to a contrasting one in a different social organization.

We can transfer only basic principles and the skills to learn. Most

of the actual techniques of soil use and conservation must be invented

on the spot to fit the local kinds of soil and social systems. Usually

changes in these systems can be made only slowly.

Somewhat many of the key people responsible for food production

in these countries, including some of their American and European

advisors, assume that agriculture is relatively simple. They assume

that "someone" knows what are the best practices. It is only neces-

sary to find this "someone", to have him explain them, and to set

up an extension program to carry the good word to the cultivators.

What they fail to appreciate is that we have been studying the soils of advanced countries many years. Soil surveys have been made, often two or three times in the past 75 years, as our knowledge increased.

Even though there are more kinds of soil in the Tropics than in all the rest of the world put together, actually little is known about great soil areas occupied by many hundreds of millions of farm people.

Without this essential scientific background, substantial progress is impossible. Had I the time and you the patience I could pile up example after example of both little and great schemes going to ruin for a lack of local soil knowledge - knowledge that we are beginning to take for granted in all advanced countries. Just 10 days ago, I hope I killed a big scheme costing millions that would have led to a complete failure in a poor country with great soil resources if understood and used correctly.

Actually we have hardly begun to put science to work for improving agriculture. And it could be done. Of course, I don't know whether we can have world peace even if we do solve the food problem. But I am sure there will not be peace while millions live on the edge of starvation.

And it is such a pity that we do not try harder. With a fraction of the money and brains now used in the world for celestial mechanics^P alone, the battle of food can be won, while there is time.

What they fail to appreciate is that we have been studying

the soils of advanced countries many years. Soil surveys have

been made, often two or three times in the past 75 years, as

our knowledge increased.

Even though there are more kinds of soil in the Tropics than

in all the rest of the world put together, actually little is known

about great soil areas occupied by many hundreds of millions of

farm people.

Without this essential scientific background, substantial

progress is impossible. Had I the time and you the patience I

could pile up example after example of both little and great schemes

going to ruin for a lack of local soil knowledge - knowledge that

we are beginning to take for granted in all advanced countries.

Just 10 days ago, I hope I killed a big scheme costing millions

that would have led to a complete failure in a poor country with

great soil resources if understood and used correctly.

Actually we have hardly begun to put science to work for improving

agriculture. And it could be done. Of course, I don't know whether

we can have world peace even if we do solve the food problem. But

I am sure there will not be peace while millions live on the edge

of starvation.

And it is such a pity that we do not try harder. With a fraction

of the money and brains now used in the world for celestial mechanics

alone, the battle of food can be won, while there is time.

I wanted to make this point here, in Honolulu. Here you have developed to a high level some aspects of tropical agriculture. You have the facilities and experience on which to build a tropical soil research institute that can begin to develop the basic soil data needed for an efficient agriculture in many countries. The need is very great and, I fear, the time is running out.

I wanted to make this point here, in Honolulu. Here you

have developed to a high level some aspects of tropical agri-

culture. You have the facilities and experience on which to

build a tropical soil research institute that can begin to

develop the basic soil data needed for an efficient agriculture

in many countries. The need is very great and, I fear, the

time is running out.

April 26 (Sunday)

We have breakfast about 8:00 and around 10:30 Mel Williams comes to take us on a tour of Honolulu. He is very generous and although I get quite a few pictures, I have enough sight-seeing by the time we reach his home about 2:00 p.m. (K-2952-4) We have a pleasant dinner and afternoon chez Williams and are back to the hotel a little after 8:00.

April 26 (Sunday)

We have breakfast about 8:00 and around 10:30 Mel Williams

comes to take us on a tour of Honolulu. He is very generous and although I get quite a few pictures, I have enough seeing by the time we reach his home about 2:00 p.m. (K-2922-4) We have a pleasant dinner and afternoon chez Williams and are back to the hotel a little after 8:00.



K-2952. April 26, 1959. Hawaii. Honolulu.
View along the sea.



K-2953. April 26, 1959. Hawaii. Honolulu.
View of Honolulu toward Diamond Head
from near Punchbowl.

K-2923. April 26, 1959. Hawaii. Honolulu.
View of Honolulu toward Diamond Head
from near Punchbowl.

K-2922. April 26, 1959. Hawaii. Honolulu.
View along the sea.



K-2954. April 26, 1959. Hawaii. Honolulu.
View toward Pearl Harbor from near Punchbowl.

K-2554. April 26, 1959. Hawaii. Honolulu.
View toward Pearl Harbor from near Punchbowl.



K-2958. April 27, 1959. Hawaii. Honolulu. Patio of Princess Kaiulani Hotel.



K-2959. April 27, 1959. Hawaii. Honolulu. Partial view of Princess Kaiulani Hotel.

K-2958. April 27, 1959. Hawaii. Honolulu. Part of
Princess Kaiulani Hotel.

K-2959. April 27, 1959. Hawaii. Honolulu. Partial
view of Princess Kaiulani Hotel.

Center for Soil Research Is Proposed for Hawaii

A proposal for a soil research center in Hawaii that would help Asia solve its food problem was presented Saturday night at the annual banquet of the Hawaii Academy of Science, held at the Hawaiian Village Hotel.

The proposal was made by Dr. Charles E. Kellogg, assistant administrator of the U.S. Soil Conservation Service, Washington, D.C.

Dr. Kellogg, who has spent much time in Asia during the last few years, said,

"There will be no world peace while millions live on the edge of starvation.

"You have here the facilities and experience on which to build a tropical soil research institute that can begin to develop the basic soil data needed for efficient agriculture in many countries," he said.

Pointing out that the population in many underdeveloped countries is growing faster than food supplies, the agriculturist said: "This

is not because of any general lack of soil resources."

Kellogg indicated that the fault lies with the lack of scientific data on "great soil areas occupied by many hundreds of millions of farm people."

HARDLY BEGUN

He added: "We have hardly begun to put science to work for improving agriculture. . . .

"With a fraction of the money and brains now used in the world for celestial mechanics alone, the battle of food can be won, while there is time. . . .

"The need is very great and, I fear, the time is running out."

SEMINARS

In another talk later in the evening, Doak C. Cox, retiring president of the Honolulu Academy of Sciences, announced that the organization's seminar series for science teachers will be extended to the Neighbor Islands.

Extension of the program has been made possible, he said, by a \$7,000 grant from the National Science Foundation.

OFFICERS

Cox was succeeded as president by Vernon E. Brock, head of the Federal Fish and Wildlife Biology laboratory here.

President-elect is Dr. Fred I. Gilbert, of Straub Clinic, and counselor is Dr. Gordon A. Macdonald, geology professor at the University of Hawaii.

Re-elected were Dr. Sterling Wortman, secretary, and Mrs. Eleanor Anderson, treasurer.

Governor Quinn was a guest at the banquet.

April 27

We discover this morning that we must check out at noon so we pack and I leave Mommy to check out.

About 8:45 Mr. Christ takes me to the Pineapple Research Institute for a talk with Dr. B. C. Eckern. He is doing a lot of interesting work in the borderline between soil physics and climatology.

He tells me that the plastic or polyethylene sheets are better than ordinary paper for mulching pineapples providing they are black; but clear or white ones go to pieces within a month under the tropical sun. But the black polyethylene is extremely difficult to dispose of when it is ready to shred the old pineapples and prepare for a new crop. Even heavy disk harrows will not tear it; they simply push it down in the soil. This is intolerable since it is an absolute barrier to either roots or water. One plantation burns the polyethylene but in the process this burns a very large part of the old pineapple plants that are normally shredded to make a mulch of over 100 tons to the acre.

He points out that using the trash mulch is a problem where the climate is cool. Root growth is low at 68°F. and essentially stops at 65°F. The plants require both high soil temperature and high air temperature. Of course the pineapple has a small, weak root system. There are no roots into soils with bulk densities above 1.3 or 1.4. Some of the Hawaiian soils have these high bulk densities but once broken up by cultivation they stay open.

April 27

We discover this morning that we must check out at noon so we

pack and I leave Mommy to check out.

About 8:45 Mr. Christ takes me to the Pineapple Research Institute

for a talk with Dr. B. C. Eckern. He is doing a lot of interesting

work in the borderline between soil physics and climatology.

He tells me that the plastic or polyethylene sheets are better

than ordinary paper for mulching pineapples providing they are black;

but clear or white ones go to pieces within a month under the tropical

sun. But the black polyethylene is extremely difficult to dispose of

when it is ready to shred the old pineapples and prepare for a new

crop. Even heavy disk harrows will not tear it; they simply push

it down in the soil. This is intolerable since it is an absolute

barrier to either roots or water. One plantation burns the poly-

ethylene but in the process this burns a very large part of the

old pineapple plants that are normally shredded to make a mulch

of over 100 tons to the acre.

He points out that using the trash mulch is a problem where

the climate is cool. Root growth is low at 68°F. and essentially

stops at 65°F. The plants require both high soil temperature and

high air temperature. Of course the pineapple has a small, weak root

system. There are no roots into soils with bulk densities above

1.3 or 1.4. Some of the Hawaiian soils have these high bulk densi-

ties but once broken up by cultivation they stay open.

He also speaks of the use of trees on some cloudy hillsides to increase rainfall as much as 30 inches annually. He hopes to develop other devices to use as well as trees in areas where it is very important to increase the water impounded for irrigation.

We drive over to the field experiment station of the Institute, called Wahiawa.

On the way we pass pineapples on Reddish-Brown Latosol from basalt where they are irrigating with about 1 to 1-1/2 inches of water. He says that this is all the water the soils will hold in the upper 10 inches. I had understood from Williams that on Lanai, that they used about one-half inch at each monthly irrigation, but Eckern says they use an inch when they can. Normally growing pineapples have a consumptive use of about one inch per month. The soil is so well aggregated that it takes in water about like coarse sand. He says that a young stand of pineapples just beginning requires more water than a mature stand since the shading reduces evaporation enough to more than compensate for transpiration. In fact, the ratoon crops rarely require irrigation because of the heavy cover and of the water stored in the old pineapple stumps and crowns. He also tells me that pineapples use more water at night, despite fairly heavy dews than during the day. From his automatically-weighing lysimeters, he is convinced that nearly all of the dew results from condensation of water coming out of the soil and is not dew water added to the soil-plant system from the air.

He also speaks of the use of trees on some cloudy hill-sides to increase rainfall as much as 30 inches annually. He hopes to develop other devices to use as well as trees in areas where it is very important to increase the water impounded for irrigation. We drive over to the field experiment station of the Institute, called Wahiawa.

On the way we pass pineapples on Reddish-Brown Latosol from basalt where they are irrigating with about 1 to 1-1/2 inches of water. He says that this is all the water the soils will hold in the upper 10 inches. I had understood from Williams that on Lanai, that they used about one-half inch at each monthly irrigation, but Eckert says they use an inch when they can. Normally growing pineapples have a consumptive use of about one inch per month. The soil is so well aggregated that it takes in water about like coarse sand. He says that a young stand of pineapples just beginning requires more water than a mature stand since the shading reduces evaporation enough to more than compensate for transpiration. In fact, the taro crops rarely require irrigation because of the heavy cover and of the water stored in the old pineapple stumps and crowns. He also tells me that pineapples use more water at night, despite fairly heavy dews than during the day. From his automatically-weighing lysimeters, he is convinced that nearly all of the dew results from condensation of water coming out of the soil and is not dew water added to the soil-plant system from the air.

I see his automatic-weighing lysimeter. He has a box filled with soil setting on water-filled inner tubes. I see one for grass (K-2955) and one about 5 feet square with large pineapples (K-2956). The instruments seem to be quite sensitive. In addition he has several rain gauges, automatic measurements of soil temperature at various depths, and instruments for measuring humidity, evaporation, sunshine, and all the other usual factors.

With a complete plant cover consumptive use of water by pineapples is about one-third that of sod. This is a very great exception to the formulae proposed by Thornthwaite and Penman and I am sure there are others. The pores of the plant close during the day and water moves from the soil into the plant. But the soil-plant system loses more water during the night than it does during the day.

He says that the maximum water use by pineapples is about 0.07 inches per day. Under field use where the tension is allowed to go to 4 atmospheres and is then brought back by irrigation, about .05 inch is used. If the soil is allowed to go to 15 atmospheres and is then brought back, the field use is about .03 inch.

In demonstrating the small root system of the pineapple plant, he pulls up one. I note severe nematode damage despite their fumigation. Normally they fumigate before planting and again later when the plants are well started.

Station, Oahu. Automatic weighing lysimeter
K-2955. April 27, 1952. Hawaii. Wahiawa Pineapple
with grass. (1952-1953)



K-2956. April 27, 1959. Hawaii. Wahiawa Pineapple Station, Oahu. Automatic weighing lysimeter with pineapples.



K-2957. April 27, 1959. Hawaii. Wahiawa Pineapple Station, Oahu. Field lysimeter.

K-2957.

April 27, 1959. Hawaii. Wahiawa Pineapple
Station, Oahu. Field lysimeter.

K-2956.

April 27, 1959. Hawaii. Wahiawa Pineapple
Station, Oahu. Automatic weighing lysimeter
with pineapples.

He says that good pineapples can be grown with 12 inches of water per year without letting the soil water drop below 15 atmospheres. The comparable figure for sugarcane is about 80 inches, roughly the same as grass. Pan evaporation is about 65 inches. He then shows a new field setup (K-2957).

Ideally for conserving water it is best to irrigate pineapples at night and as rapidly as possible. Although a xerophytic plant, Eckern says that the pineapple does respond to water with root growth, leaf elongation, and fruiting.

Dr. Eckern gives me several mimeographed statements on his work which he says he will send me by post. I am very much impressed with this man and the importance of what he is doing.

Mr. Christ and I leave the field station about 11:40 and stop for lunch at a roadside restaurant. We stop briefly at the SCS office and then drive out to see Dr. L. D. Baver, Director of the Experiment Station of the Hawaiian Sugar Planters Association.

We exchange experiences about tropical soils and have a pleasant two-hour chat.

Then I return to the hotel where Mommy has everything all packed. Shortly after tea we take the bus at 5:30 for the airfield. We check in and have a long wait. We board the plane at 6:45 and the wheels are in the air at 7:10.

Dinner is served very slowly indeed but it is excellent when it comes, especially the Idlewild Farm Game Hen a la Kiev.

As one day changes to another we move our watches ahead three hours.

hours.

As one day changes to another we move our watches ahead three

comes, especially the Idlewild Farm Game Hen a la Kiev.

Dinner is served very slowly indeed but it is excellent when it

are in the air at 7:10.

in and have a long wait. We board the plane at 6:45 and the wheels

Shortly after tea we take the bus at 5:30 for the airfield. We check

Then I return to the hotel where Mommy has everything all packed.

Two-hour chat.

We exchange experiences about tropical soils and have a pleasant

Station of the Hawaiian Sugar Planters Association.

and then drive out to see Dr. L. D. Bayer, Director of the Experiment

for lunch at a roadside restaurant. We stop briefly at the SCS office

Mr. Christ and I leave the field station about 11:40 and stop

this man and the importance of what he is doing.

which he says he will send me by post. I am very much impressed with

Dr. Eckern gives me several mimeographed statements on his work

leaf elongation, and fruiting.

Eckern says that the pineapple does respond to water with root growth,

at night and as rapidly as possible. Although a xerophytic plant,

Ideally for conserving water it is best to irrigate pineapples

He then shows a new field setup (K-2927).

roughly the same as grass. Pan evaporation is about 65 inches.

pheres. The comparable figure for sugarcane is about 80 inches.

water per year without letting the soil water drop below 15 atmos-

He says that good pineapples can be grown with 12 inches of

April 28

The California coast comes into view about 6:20 and the wheels are down in the San Francisco airport at 6:35 a.m.

Bill Johnson meets us and we are at the St. Francis Hotel at 7:45. We have breakfast while our room is made ready.

We try to get some sleep, then go for lunch and a short walk. About 3:00 Bill Johnson comes again for us and takes us to his home in Berkeley. On the way he stops to show us an especially nice nursery with Bonsai plants and many others. We pay one dollar for a beautiful Himalayan rhododendrum - *Fragrantissium*. We have pleasant conversation and dinner and then several others come in for dessert and coffee. We are back to the hotel at 11:30, very sleepy.

April 28

The California coast comes into view about 6:20 and the

wheels are down in the San Francisco airport at 6:35 a.m.

Bill Johnson meets us and we are at the St. Francis Hotel at

7:45. We have breakfast while our room is made ready.

We try to get some sleep, then go for lunch and a short

walk. About 3:00 Bill Johnson comes again for us and takes

us to his home in Berkeley. On the way he stops to show us an

especially nice nursery with Bonasal plants and many others. We

pay one dollar for a beautiful Himalayan rhododendrum -

fragrantissimum. We have pleasant conversation and dinner and

then several others come in for dessert and coffee. We are back

to the hotel at 11:30, very sleepy.

April 29

We are up at 6:00 a.m., pack, breakfast, and go to the city air station. We reach the airport about 8:10 a.m. We board the plane at 8:55 and are in the air for Washington at 9:20 - 20 minutes late.

The wheels are down at the Washington airport at 7:35. Elizabeth Austin is there to meet us and take us back to our home. How good it seems to be once more in our own house.

oOo

April 29

We are up at 6:00 a.m., pack, breakfast, and go to the city air station. We reach the airport about 8:10 a.m. We board the plane at 8:55 and are in the air for Washington at 9:30 - 30 minutes later.

The wheels are down at the Washington airport at 7:35. Elizabeth Austin is there to meet us and take us back to our home. How good it seems to be once more in our own house.

ooo

A few special words

Bajra is a kind of millet-like crop.

A bund is, roughly, an earth terrace for water control. Small bunds for water control may be only 10 inches wide and a foot high; contour bunds may be 6 to 10 feet wide at the base and 3 to 4 feet high. But terraces with nearly vertical earth or stone faces and back-sloping surfaces are called "terraces" in India.

The crop year in India for most crop reporting is July 1 to June 30.

A crore is ten million (commonly written in India as 1,00,00,000).

The fiscal year in India extends from April 1 to March 31 and most trade statistics cover this period.

A ghanat (or qanat) is a subterranean canal that collects and conducts water, marked by fairly closely spaced holes to the surface some 3 or 4 feet in diameter.

Ghee is clarified, white, semi-liquid butter.

A godown is a warehouse or storage building.

Gram is an important kind of pulse grown in India as a Rabi crop.

Gram sahayak is a local village leader and helper in working for improvements in village life and economy.

Gram sevak is a village-level (extension) worker.

Gram sevika is a female village-level (extension) worker.

Gur is unrefined sugar made in villages.

Jowar is a grain sorghum - an important Kharif crop under dryland farming.

farming.

Jowar is a grain sorghum - an important Kharif crop under dryland

Gur is unrefined sugar made in villages.

Gram sevika is a female village-level (extension) worker.

Gram sevak is a village-level (extension) worker.

for improvements in village life and economy.

Gram sahayak is a local village leader and helper in working

Gram is an important kind of pulse grown in India as a Rabi crop.

A godown is a warehouse or storage building.

Ghee is clarified, white, semi-solid butter.

3 or 4 feet in diameter.

water, marked by fairly closely spaced holes to the surface some

A ghanaat (or ganat) is a subterranean canal that collects and conducts

trade statistics cover this period.

The fiscal year in India extends from April 1 to March 31 and most

A crore is ten million (commonly written in India as 1,00,00,000).

The crop year in India for most crop reporting is July 1 to June 30.

faces and back-sloping surfaces are called "terraces" in India.

4 feet high. But terraces with nearly vertical earth or stone

contour bunds may be 6 to 10 feet wide at the base and 3 to

for water control may be only 10 inches wide and a foot high;

A bund is, roughly, an earth terrace for water control. Small bunds

Bajra is a kind of millet-like crop.

A few special words

Kankar is roughly equivalent to caliche or croute calcaire. Most commonly it is applied to an indurated layer of coarsely nodular calcium carbonate.

A Kharif crop is one grown during the summer monsoon period and harvested in autumn. Examples include rice, jowar, bajra, maize, cotton, jute, tobacco, and groundnut (peanuts).

(Contrast to Rabi crop)

A lakh is one hundred thousand (commonly written in India as 1,00,000).

Maund is a unit of weight, commonly 82-2/7 pounds or 40 seers.

Murram is commonly applied to concretionary laterite. In India the word is used very loosely for other concretionary materials, even calcium carbonate, in local areas not having laterite.

A Rabi crop is one sown in autumn and harvested in the spring. Examples include wheat, barley, gram, peas, linseed (seed flax), mustard, rapeseed, and potatoes.

Rupee is the monetary unit of India, equal to 16 annas in the old system and 100 naiya paisa in the new.

A seer is a unit of weight a bit over 2 pounds.

Kankar is roughly equivalent to caliche or crinite calcare. Most

commonly it is applied to an indurated layer of coarsely

nodular calcium carbonate.

A Kharif crop is one grown during the summer monsoon period and

harvested in autumn. Examples include rice, jowar, bajra,

maize, cotton, jute, tobacco, and groundnut (peanuts).

(Contrast to Rabi crop)

A lakh is one hundred thousand (commonly written in India as 1,00,000).

Mand is a unit of weight, commonly 82-2/7 pounds or 40 seers.

Murrum is commonly applied to concretionary laterite. In India the

word is used very loosely for other concretionary materials,

even calcium carbonate, in local areas not having laterite.

A Rabi crop is one sown in autumn and harvested in the spring. Examples

include wheat, barley, gram, peas, linseed (seed flax), mustard,

rapeseed, and potatoes.

Rupree is the monetary unit of India, equal to 16 annas in the old

system and 100 maysa paise in the new.

A seer is a unit of weight a bit over 2 pounds.

Food Target Of 110 Million Tons Suggested

FORD TEAM SAYS RATE OF INCREASE MUST TRIPLE

BY OUR SPECIAL CORRESPONDENT

NEW DELHI, Tuesday.

FOOD production must be given the highest priority. It must have the sponsorship of topmost leaders who can mobilize the nation for action to meet the impending crisis.

This is the main recommendation of the United States agricultural production experts who came out to India at the request of the Food and Agriculture and Community Development Ministries. The Ford Foundation sponsored the visit.

The team's 254-page report, which was officially issued today, calls for an emergency food production programme to realize a 100-million-ton target by 1965-66, end of the third Plan period. India can meet the crisis, the report concludes.

The team's spotlights the impending gap between the increase in population and food production. If food production increases no faster than at the present rate, the gap between supplies and target will be 28 million tons by 1965-66. This will mean a shortfall of 25 per cent. No conceivable programme of imports or rationing can meet a crisis of this magnitude, it is emphasized.

The proposed target is described as reasonable and capable of achievement. Eighty million more people, or a total population of about 480 millions, are expected by the end of the third Plan. A 110-million-ton target is needed to provide food enough for the added millions, and to provide for some dietary improvement and a safety margin for poor crop years and emergency conditions.

The best of Indian agriculture, the report says, is comparable to the best in other countries. The

task is to develop ways of raising the low average to the highest average which some Indian cultivators have achieved.

A far-reaching centralized authority with a clear line of command and execution alone can meet the challenge, the report says.

The team believes that such authority is essential to allocate resources on a priority basis, such as personnel, fertilizers, steel for sprayers, godowns and fertilizer plants to co-ordinate irrigation, drainage and soil management programmes; and to enforce policy decisions giving priority to food production. The administrative

structure, moreover, must be simplified and clear lines of authority and responsibility established at all levels of the Government, so that policy decisions are carried out to the village level.

SUGGESTIONS

The report has suggested the following measures to be included in the all-out production drive:

1. A public works programme to increase food production and village employment. The unemployed and underemployed in the villages represented a waste of resources that should be used to produce more food. It, therefore, recommended a public works programme for projects requiring primarily hand labour such as contour building, land levelling, surface drainage, irrigation, wells and tanks. Such work would contribute directly to increasing food production and provide income for needy people.

2. Fuller use of manures, composts and green manures. This would, however, substitute only a small fraction of the chemical fertilizers needed to meet the third Plan targets. The Food and Agriculture Ministry targets for fertilizers of 1,500,000 tons of nitrogen, 750,000 tons of phosphoric acid and 1,200,000 tons of potash were soundly based but conservative.

3. Irrigation and drainage programmes should be intensified. It has recommended that the third Plan should allocate substantial funds for technical assistance to cultivators in making better use of available water and that drainage be improved.

INTENSIVE CULTIVATION

4. Certain crops and areas should be selected for intensive cultivation. Efforts to stimulate production should be directed more heavily towards rice and wheat which now make up 62 per cent of the total food crops. For rice there were already 25 important growing districts which could be selected while for wheat there were selected districts in Punjab, Uttar Pradesh, Madhya Pradesh and Bihar.

5. Assurance of stability of tenure could contribute substantially to food production. In view of this the team has recommended that land ceilings and other land reforms should be made as quickly as possible and settled for the third plan.

CREDIT FACILITIES

6. Arrangements should be made to provide immediate large-scale credit through co-operatives. The present marketing, supply and credit services were major deterrents to increasing food production, 85 per cent of credit being supplied by money lenders and others.

To help co-operatives to function effectively, the team's major recommendations were that the Government should be prepared to provide loans and to assist in developing a capable management, and that standards of creditworthiness should be redefined to encourage production loans on the basis of expected crop yields and repayment ability instead of land security.

A guaranteed minimum price announced in advance of the planting season is recommended as an incentive to increased production. Other proposed incentives are a market within bullock-cart distance that will pay the guaranteed market price when the cultivator has to sell and suitable local storage.

CARE OF CATTLE

Immediate consideration should be given to using funds available from grain imports under PL 480 and other special programmes to construct needed godowns in village areas.

The team recognizes the limitations which beliefs concerning cattle slaughter imposed. Therefore, the team recommends enactment of legislation providing for a tax policy which makes maintenance of useless cattle a burden on their owners; confinement of all bulls and mandatory castration of all bulls not kept for breeding; measures to control open grazing; establishment of desiccating plants to process fallen animals, with incentive payments to owners who bring in fallen cattle.

Community development and all technical agencies must be geared to mobilizing and strengthening of village leaders and organizations and effective channeling to village people of all information and help necessary to increase food output. Therefore, all Ministries concerned with any aspect or programme relevant to food production must give top priority to food production now and for the period of the third Plan.

Achieving 110m-Ton Food Target By 1966

FORD FOUNDATION TEAM'S RECOMMENDATIONS

"The Times of India" News Service

NEW DELHI, April 21, 1959

A RATE of food production increase of 8.2 per cent. per annum to achieve a third Plan target of 110 million tons required to feed an estimated population of 480 million by 1966 has been suggested by an American agricultural production team sponsored by the Ford Foundation and invited by the Government of India.

This compares with an average annual increase of 3.2 per cent. from 1952-53 to 1958-59.

Unless this step is achieved, there will be a shortfall of about 28 million tons or 25 per cent. of requirements. No conceivable programme of imports or rationing can meet a crisis of this magnitude.

In a report entitled "India's food crisis and steps to meet it," the team states that a 110-million-ton target is perfectly possible provided an "all-out emergency food production programme" is undertaken.

IMPORTANCE OF INCENTIVES

The team emphasises the virtual importance of incentives if the farmer is to be persuaded to invest in fertilisers, better implements, improved seeds and other expenses necessary to increase production.

The incentives recommended are:

(A) A guaranteed minimum price announced in advance of the planting season.

(B) A market within bullock-cart distance that will pay the guaranteed price when the cultivator has to sell.

(C) Suitable local storage. Immediate consideration should be given to using funds available from grain imports under P.L.480 and other special programmes to construct needed godowns in village areas.

The team notes that the unemployed and underemployed in the villages represent a waste of resources that should be used to produce more food. Moreover, about 45 million of the 80 million increase in population will be rural people. The team recommends a public works programme for projects requiring primarily hand labour, such as contour bunding, land levelling, surface drainage, irrigation wells and tanks. Such work will contribute directly to increasing food production, provide income for needy people and will not be inflationary.

While the use of manures, com-

post and green manures is commended, special stress is laid on the fact that only with more abundant use of chemical fertilisers will benefits from irrigation, bunding, improved seeds and other facilities be realised.

The Food Ministry's fertiliser target for the third Plan is stated to be conservative in relation to need despite a nine-fold increase proposed. The targets are 1.5 million tons of nitrogen, 750,000 tons of phosphoric acid and 200,000 tons of potash.

Considerable attention is also devoted to the need for better "water management." India now gets only one-fifth to one-fourth of a ton increase in crop yields on irrigated lands as compared to non-irrigated lands. Moreover, only about 12 per cent. of the irrigated acreage grows more than one irrigated crop per year. This is wasteful.

The team, therefore, believes that India can make greater and more immediate gains in food production by intensifying expenditure of time and effort on water management than by constructing large-scale irrigation projects which take years to develop.

LAND RECLAMATION

Millions of acres could also be reclaimed and made more productive by drainage improvement.

The team is of the view that the best in Indian agriculture is comparable to the best in other countries. The task is to develop ways of raising the low average to the highest levels which some Indian cultivators have achieved.

There are tremendous physical potentialities for increasing production per acre. There are no inherent soil, climatic or physical reasons for the present low yields. But there are no blanket proposals that can be generally applied to reach the third Plan target. The team recommends that those selected crops and those selected acres in each State should be chosen which have the greatest increase potentialities.

Assurance of stability of tenure can contribute substantially to food production. Ceilings and land reforms should, therefore, be settled as quickly as possible, and stay settled for the third Plan.

MAJOR DETERRENTS

The present marketing, supply and credit services are major deterrents to increasing food production. Eighty-five per cent. of credit is now supplied by money-lenders and other individuals. Most marketed grains are sold to local traders at harvest time at depressed prices. Strong co-operatives can break these bonds.

To help co-operatives to do so effectively the team's major recommendations are that (1) the Government must be prepared to provide loans and to assist in developing capable management; and (2) standards of credit worthiness must be redefined to encourage production loans on the basis of expected crop yields and repayment ability, instead of land security.

ANIMAL POPULATION

The excessive animal population competes with people for the products of the land. The team recognises the limitations imposed by beliefs concerning cattle slaughter. It, therefore, recommends that legislation be considered providing for (1) a tax policy which makes maintenance of useless cattle a burden on their owners (tax receipts could go to villages for improvements); (2) confinement of all bulls and mandatory castration of all bulls not kept for breeding; (3) measures to control open grazing; (4) establishment of desiccating plants to process fallen animals, with incentive payments to owners who bring in fallen cattle.

Far-reaching centralised authority with a clear line of command and execution alone can meet the challenge of growing more food. The administrative structure must be simplified and lines of authority and responsibility established at all levels of Government, so that policy decisions are carried out to the village level.

Indian Finance

116, Lower Circular Road
Calcutta-14

The Editor presents his compliments
and draws your attention to the en-
closed cutting as it might prove to be
of interest to you.

Dr. Charles E. Kellogg
Assistant Administrator for Soil Survey
Soil Conservation Service
U.S. Department of Agriculture
Washington
D. C.

Food For India's Growing Population

Ford Foundation Team's Recommendation

THE population of India is now estimated at over 400 millions, and the rate of annual increase is about two per cent. The total population by 1966 is expected to reach 480 million. To feed this population at minimum levels of nutrition, based on a daily intake of 15 oz of cereals and 3 ounces of pulses yielding less than 1800 calories, will require 88 million tons of foodgrains. Allowing for seed, wastage and a safety margin, a total foodgrain output of 110 millions will be necessary to provide for a consumption of 88 million tons. As against requirements of this order, production during 1958-59 is estimated at 70 million tons. Foodgrain output has increased from 58 million tons in 1949-50 to 65 million tons at the end of the First Plan. At the present rate of increase, production in 1965-66, that is, at the end of Third Plan, will be of the order of 82 million tons, or 28 million tons short of requirements. To make up the deficit, which cannot be filled by any conceivable programme of imports, it will be necessary to step up the rate of increase of food production from 3.2 per cent during the period 1952-53 to 1958-59 to an average level of 8.2 per cent in the next seven years. These figures will give an idea of the magnitude of the food problem the country will have to deal with in the next few years. Will it be possible to achieve the greatly accelerated expansion of production that will be necessary to avert a disastrous crisis?

We can draw comfort from the affirmative answer given to this question by the Ford Foundation Team of agricultural experts, which has recently reported on "India's Food Crisis And The Steps Needed To Meet It." The target can be achieved, says the Report, if appropriate measures are taken under an emergency food production programme. The best in Indian agriculture is comparable to the best in other countries, but the average level is unduly low. The main task, therefore, is to develop ways of raising the low

average to the higher levels already attained by individual Indian cultivators. At the same time, the Report adds the warning that a 110-million ton target can be realised only if an all-out emergency food production programme is undertaken and adequate resources are made available. High priority for food production must be ensured by sponsorship at the topmost levels of leadership, while the entire nation must be made aware of the crisis and of the steps that must be taken to meet it. In a Report covering about 250 pages, the Ford Foundation Team has drawn up a programme of action which, if implemented at all levels, will enable the country to reach the desired increase in output.

Before considering the detailed recommendations, it will be worth while to have an idea of the credentials of the expert team. The Team consisted of thirteen members, each of whom had specialised in some aspect or other of agriculture. All of them had long association with agricultural problems in the United States and besides, had experience in the review of the problems of agriculture in other countries. Three of them had been in India before and its Chairman, Dr Sherman E. Johnson, was president of the Mysore meeting of the International Conference of Agricultural Economists in 1958. The Team was in India for a period of nine to ten weeks from January 23-25 to April 4-7. During this period, the team visited every State in the Union. It was assisted by a team of Indian specialists and administrators and had the benefit of consultation with resident members of the Ford Foundation and of the Rockefeller Foundation. Though in India only for a short period, the team has put in an intense and earnest effort whose results are evident in every page of the Report, a competent and workmanlike document that brings to bear on every topic under consideration the available knowledge on the subject. As an authoritative guide to programmes of increased food

production, the Report is not likely to be superseded in the near future.

The Report recognises that there are no simple solutions to India's food problem. It also emphasises the fact that India is a large country and no blanket programme can fit all areas and situations. In submitting its recommendations, the Team has made the following assumptions:

1. Programmes to increase foodgrain production will receive the funds that are required for such items as credit, fertilizer, seed, soil and water conservation, including irrigation and drainage, other land development, plant protection, food storage and processing facilities.
2. Adequate personnel will be trained and assigned to the job of increasing food production.
3. At all levels, top leadership will be provided and coordination will be achieved among planners, administrators, educators, natural scientists, social scientists, local community leaders and cultivators. Without such leadership and coordination, no production programme can be successful.
4. Efforts will be concentrated where results will be greatest.
5. Since most of the risks associated with programmes to increase food production fall on cultivators, they will be protected from price declines that would discourage expanding of production, and steps will be taken to stabilise food supplies and prices over time and space.

The Report is in three parts. The first part highlights the need for adoption of emergency measures, which are briefly indicated in the second part. The individual programmes of action are dealt with in detail in the third part.

The recommendations are comprehensive and cover all aspects of improved agricultural practice. These include stabilisation of prices, a public works programme for increasing food production and rural employment, larger use of fertilisers, intensified irrigation and drainage programmes, assurance of stability of tenure, reorganisation of agricultural credit, special efforts to increase yield in selected areas suitable to particular crops, reduction in numbers of cattle and the need for a high level

authority for coordinating the food production programme.

The most interesting of the Team's recommendations, and one which if implemented will effect a radical transformation, not only in the agricultural situation but also in the general economic outlook, is the proposal for a public works programme to increase rural employment and to provide more food. The Report points out that excellent opportunities exist for putting unemployed and underemployed rural people to work on public projects requiring primarily hand labour which will directly improve the productive capacity of agriculture, such as contour bunding, land levelling, surface drainage, irrigation wells and tanks. As the projects will directly contribute to increased food production, the expenditure on such a programme, which will immediately effect a substantial reduction in unemployment, need not be inflationary. Chapter 1-3 of the report of the Ford Foundation team, dealing with this public works programme, should help our planners to realise that a programme for the essential increase in food production is also a programme for full employment. With this realisation, they should be able to put eradication of unemployment in the forefront of the objectives of the Third Plan.

The Report has also indicated the broad principles that should govern such a programme. A State or Central Government agency should be responsible for approval of the projects and supervision of work, while the projects themselves should be limited to those:

1. Which will have a direct effect on food production;
2. Which require little or no capital expenditure, and can be carried out primarily with hand labour;
3. Which require little or no scarce material and little or no foreign exchange; and
4. For which people with the necessary skills to supervise the work are available or can be trained.

To yield best results, priority should be given to projects which will make the greatest and most immediate contribution to food production and to areas where there is serious unemployment.

In our country, where cultivation is carried on by millions of small holders, the prospects of adoption of improved methods of cultivation depend on the prospect of an economic return to the agriculturist. This depends on assurance of stability of tenure, stable prices and necessary marketing and credit facilities. Price fluctuations, which wipe out the return from increased yields, can neutralise all efforts to persuade the agriculturists to adopt improved methods of cultivation. Uncertainty about land reforms and tenures is currently one of the inhibiting factors in agriculture.

The Report emphasises that the following specific assurances are required by the cultivator as incentives for increased production:

1. A guaranteed minimum price publicised in advance of the planting season;
2. A market that is ready to accept his crops at the floor price at the time he wants to sell;
3. Availability of this market within bullock cart hauling distance; and
4. Suitable local storage for the portion of the crops which he does not wish to sell at harvest time. In this connexion the committee has suggested use of PL 480 funds for godown construction.

The Report emphasises that price stabilisation is a systematic and continuous process which can be accomplished only by a permanent agency which can formulate price policy and implement it by appropriate action.

Regarding credit, marketing and supply services, the Report points out that present arrangements, with the money lender dominating the scene, are major deterrents to increased production. Cooperatives offer the obvious solution for most of the problems. But at the same time, it is necessary to remember that there is "no magic in the cooperative form of organization which assures success." Cooperatives, the Report emphasises, "will succeed only if they perform economic functions better than they are now being performed."

Regarding cooperative farming, the Report recommends the adoption of an experimental and objective approach. The Report emphasises that the success of cooperative farming depends on competent management; and capable managers may not often be available. At the same time, the individual incentive for

careful tillage of the separately owned plots of land is lost in the pooling operation. The Report suggests that "management assistance to cultivators, combined with supervised credit, and perhaps with joint ownership of equipment, offers a way to obtain the advantage of better management, while still retaining the incentives gained by individual operation."

In addition to the measures of better economic and administrative arrangements to increase production, briefly indicated above, the Report has also dealt in detail with the problem of better use of physical and biological resources. The Report underlines the fact that the limitations on food production are not set by physical resources. India has the soil, climate, water and other physical resources for abundant food production. To these must be added human effort in the form of improved agricultural methods in effective combinations suited to particular soils and crops. The Report repeatedly emphasises the importance of "combined practices." No single improvement will be effective in increasing crop yields if applied in isolation. While water is of primary importance, provision of irrigation alone will not yield good results, unless the water is well controlled and its application is combined with use of fertilisers, good seed and other appropriate cultural practices. The Report points out that more immediate gains can be derived by intensifying expenditure of time and effort on water management on farms than constructing large-scale irrigation works which take years to develop.

The Report attaches the greatest importance to the role of chemical fertilisers in increasing food production and is emphatic that measures to ensure adequate supplies should have top priority if the proposed targets of production are to be attained. While commending the efforts to make larger use of manures, composts and green manure, it is pointed out that they can at best substitute for only a small fraction of the chemical fertilisers required during the next seven years. The targets for fertiliser production suggested by the Ministry of Food and Agriculture, (1,500,000 tons of nitrogen and 750,000 tons of potash to be attained at the end of the Third Plan) which will mean a nine-fold increase in the use of nitrogen and larger increases in the use of other manures, the Report says, are the very minima for meeting food production targets. In India, chemical fertilisers are usually taken

production, the Report is not likely to be superseded in the near future.

The Report recognises that there are no simple solutions to India's food problem. It also emphasises the fact that India is a large country and no blanket programme can fit all areas and situations. In submitting its recommendations, the Team has made the following assumptions:

1. Programmes to increase foodgrain production will receive the funds that are required for such items as credit, fertilizer, seed, soil and water conservation, including irrigation and drainage, other land development, plant protection, food storage and processing facilities.
2. Adequate personnel will be trained and assigned to the job of increasing food production.
3. At all levels, top leadership will be provided and coordination will be achieved among planners, administrators, educators, natural scientists, social scientists, local community leaders and cultivators. Without such leadership and coordination, no production programme can be successful.
4. Efforts will be concentrated where results will be greatest.
5. Since most of the risks associated with programmes to increase food production fall on cultivators, they will be protected from price declines that would discourage expanding of production, and steps will be taken to stabilise food supplies and prices over time and space.

The Report is in three parts. The first part highlights the need for adoption of emergency measures, which are briefly indicated in the second part. The individual programmes of action are dealt with in detail in the third part.

The recommendations are comprehensive and cover all aspects of improved agricultural practice. These include stabilisation of prices, a public works programme for increasing food production and rural employment, larger use of fertilisers, intensified irrigation and drainage programmes, assurance of stability of tenure, reorganisation of agricultural credit, special efforts to increase yield in selected areas suitable to particular crops, reduction in numbers of cattle and the need for a high level

authority for coordinating the food production programme.

The most interesting of the Team's recommendations, and one which if implemented will effect a radical transformation, not only in the agricultural situation but also in the general economic outlook, is the proposal for a public works programme to increase rural employment and to provide more food. The Report points out that excellent opportunities exist for putting unemployed and underemployed rural people to work on public projects requiring primarily hand labour which will directly improve the productive capacity of agriculture, such as contour bunding, land levelling, surface drainage, irrigation wells and tanks. As the projects will directly contribute to increased food production, the expenditure on such a programme, which will immediately effect a substantial reduction in unemployment, need not be inflationary. Chapter 1-3 of the report of the Ford Foundation team, dealing with this public works programme, should help our planners to realise that a programme for the essential increase in food production is also a programme for full employment. With this realisation, they should be able to put eradication of unemployment in the forefront of the objectives of the Third Plan.

The Report has also indicated the broad principles that should govern such a programme. A State or Central Government agency should be responsible for approval of the projects and supervision of work, while the projects themselves should be limited to those:

1. Which will have a direct effect on food production;
2. Which require little or no capital expenditure, and can be carried out primarily with hand labour;
3. Which require little or no scarce material and little or no foreign exchange; and
4. For which people with the necessary skills to supervise the work are available or can be trained.

To yield best results, priority should be given to projects which will make the greatest and most immediate contribution to food production and to areas where there is serious unemployment.

In our country, where cultivation is carried on by millions of small holders, the prospects of adoption of improved methods of cultivation depend on the prospect of an economic return to the agriculturist. This depends on assurance of stability of tenure, stable prices and necessary marketing and credit facilities. Price fluctuations, which wipe out the return from increased yields, can neutralise all efforts to persuade the agriculturists to adopt improved methods of cultivation. Uncertainty about land reforms and tenures is currently one of the inhibiting factors in agriculture.

The Report emphasises that the following specific assurances are required by the cultivator as incentives for increased production:

1. A guaranteed minimum price publicised in advance of the planting season;
2. A market that is ready to accept his crops at the floor price at the time he wants to sell;
3. Availability of this market within bullock cart hauling distance; and
4. Suitable local storage for the portion of the crops which he does not wish to sell at harvest time. In this connexion the committee has suggested use of PL 480 funds for godown construction.

The Report emphasises that price stabilisation is a systematic and continuous process which can be accomplished only by a permanent agency which can formulate price policy and implement it by appropriate action.

Regarding credit, marketing and supply services, the Report points out that present arrangements, with the money lender dominating the scene, are major deterrents to increased production. Cooperatives offer the obvious solution for most of the problems. But, at the same time, it is necessary to remember that there is "no magic in the cooperative form of organization which assures its success." Cooperatives, the Report emphasises, "will succeed only if they perform economic functions better than they are now being performed."

Regarding cooperative farming, the Report recommends the adoption of an experimental and objective approach. The Report emphasises that the success of cooperative farming depends on competent management; and capable managers may not often be available. At the same time, the individual incentive for

careful tillage of the separately owned plots of land is lost in the pooling operation. The Report suggests that "management assistance to cultivators, combined with supervised credit, and perhaps with joint ownership of equipment, offers a way to obtain the advantage of better management, while still retaining the incentives gained by individual operation."

In addition to the measures of better economic and administrative arrangements to increase production, briefly indicated above, the Report has also dealt in detail with the problem of better use of physical and biological resources. The Report underlines the fact that the limitations on food production are not set by physical resources. India has the soil, climate, water and other physical resources for abundant food production. To these must be added human effort in the form of improved agricultural methods in effective combinations suited to particular soils and crops. The Report repeatedly emphasises the importance of "combined practices." No single improvement will be effective in increasing crop yields if applied in isolation. While water is of primary importance, provision of irrigation alone will not yield good results, unless the water is well controlled and its application is combined with use of fertilisers, good seed and other appropriate cultural practices. The Report points out that more immediate gains can be derived by intensifying expenditure of time and effort on water management on farms than constructing large-scale irrigation works which take years to develop.

The Report attaches the greatest importance to the role of chemical fertilisers in increasing food production and is emphatic that measures to ensure adequate supplies should have top priority if the proposed targets of production are to be attained. While commending the efforts to make larger use of manures, composts and green manure, it is pointed out that they can at best substitute for only a small fraction of the chemical fertilisers required during the next seven years. The targets for fertiliser production suggested by the Ministry of Food and Agriculture, (1,500,000 tons of nitrogen and 750,000 tons of potash to be attained at the end of the Third Plan) which will mean a nine-fold increase in the use of nitrogen and larger increases in the use of other manures, the Report says, are the very minima for meeting food production targets. In India, chemical fertilisers are usually taken

to mean ammonium sulphate and superphosphate, which are low analysis fertilisers,—that is to say, they contain a comparatively low proportion of plant nutrients. The Report has recommended research for testing high analysis materials in Indian conditions, and for their manufacture. The Report also attaches great importance to adequate soil testing for effective use of fertilisers and has commended the work that is being done in this country in certain centres.

Recommending the adoption of a comprehensive programme for reducing the number of cattle, the Report points out that the objective "should be to improve the efficiency of draft power and to increase the quantity of animal products without using more land, or, better still, to produce more power and more animal products from less land than is now being used for these purposes." While drawing attention to the difficulties created by the prevalent sentiment against cattle slaughter, the Team has recommended other means of reducing the number of cattle and of controlling the rate of reproduction, such as

1. A graduated tax on cattle which would make the maintenance of useless cattle a burden to their owners;
2. Compulsory confinement of all bulls kept for natural service;
3. Mandatory castration of all young bulls not required for breeding;
4. Compulsory sterilisation of surplus cows and heifers; and
5. Measures to control open grazing.

In dealing with the question of cattle, the Report does not suggest that, instead of going by conventional ideas regarding India's surplus cattle, the Team had made an independent attempt to evaluate the place of cattle in

Indian agriculture and the number of cattle required for agricultural purposes. For one thing, the time at its disposal was too short to enable it to undertake an exhaustive study of the problem; and this would have been necessary if it were to appreciate the rationale of the ban on cattle slaughter which is such a radical departure from its own background and experience. The Report has drawn pointed attention to the problem created by hordes of stray cattle in States which have enacted legislation banning cattle slaughter. This is a timely reminder to those whose interest in the subject is purely sentimental that the ban on cattle slaughter is only the negative aspect of cattle preservation. And, unless accompanied by adequate measures to segregate and care for the surplus cattle, the ban by itself can only serve to accentuate the distress of both man and animal.

The effective implementation of a comprehensive programme of action which moreover comes under the jurisdictions of several Ministries, requires a far-reaching centralised authority with a clear line of command and execution. The Team believes that such an authority is essential to allocate resources on a priority basis; to coordinate irrigation, drainage and soil management programmes; and to enforce policy decisions giving priority to food production. Apart from lack of coordination, which creates confusion at the top, progress is also hampered by the lack of an adequate agency at the village level for carrying out programmes for increased production. There is need to expand and strengthen Community Development and other technical agencies so that they reach down to the villages. The Community Development movement has yet to fulfil its promise. In implementing the programmes for increased food production, it has the opportunity to justify its existence.

URGENCY OF FOOD PROBLEM STRESSED

Serious Shortfall May Lead To Famine & Starvation

"The Times of India" News Service

NEW DELHI, June 7,

THOUGH it may not be possible to implement many of the recommendations made by the Ford Foundation team on food production, the report is understood to have served an important purpose in highlighting the urgency of the problem.

It has issued the warning that if there is a serious shortfall in the suggested third Plan target of food production the possibility of starvation and famine cannot be ruled out.

In according high priority to the problem, the team has re-echoed the Prime Minister's own views in the matter. Mr. Nehru is understood to have emphasised the importance of the problem repeatedly in his periodic advice to the State Chief Ministers, where indeed, the subject is understood to have become a recurring theme.

This is in addition to suggestions made by him to the Food and Agricultural Ministry in this behalf from time to time. One of these has already resulted in a directive with regard to better utilisation of compost and green manure, especially in the present context of shortage of chemical fertilisers.

With regard to the Ford Foundation team report, it is pointed out that, for example, the suggestion with regard to the need of a unified chain of command to implement the food production drive would be tantamount to putting the State Departments of Agriculture under the Ministry of Food and Agriculture. Apart from creating numerous problems of administration, this would necessitate amendment of the Constitution in so far as it would abridge the authority and jurisdiction of the States.

PRODUCTION COUNCIL

A Central Food Production Council, consisting of State Agriculture Ministers, may not prove a very effective instrument of policy because many of the decisions would require approval of the respective Cabinets. Replacement of the Food Ministers by Chief Ministers would improve the position considerably as far as speed is con-

cerned, but the body would in any case would be rather an unwieldy one. A compact, high-powered body, consisting of three or four senior Chief Ministers, would be a more feasible proposition, but this has its own obvious drawbacks.

Another important recommendation made by the team is that effort should be concentrated on areas already advanced in the techniques and resources of food production. This is an argument, which is scientifically unassailable; but there are other equally important considerations to be borne in mind by a democratic, parliamentary Government. One of these is the demand of the backward and neglected regions for a better deal in the future. Such a plea cannot be easily brushed aside.

PLANT PROTECTION

Some other proposals made by the team, however, have already been accepted. The chief of these is plant protection measures. Another feasible suggestion is castration of useless cattle, though here again it is not possible to implement it in its entirety. Already, in selected areas, where standard of breeding is good, the Government is providing stud bulls, simultaneously castrating others used for breeding purposes till then.

Generally speaking, it is explained, the villagers themselves are not averse to the elimination of cattle of poor breed. It is the city politicians who complicate the situation. The Central Agriculture Department has, for example, approached a number of "goshala" managers, offering to replace their ill-bred, ill-fed cattle with pedigree animals, so that the "goshalas" can be run as model dairy farms. But the people concerned have steadily refused to fall in line, pointing out quite shamefacedly that if that happened their large "charity" income would wither away.

INDIA'S FOOD CRISIS*

By

M. B. Desai

The report embodies the results of the findings of a Team of U. S. experts who came out to India under the sponsorship of the Ford Foundation to advise the Government of India on India's food crisis and the ways and means of meeting it particularly in the context of the Third Five-Year Plan. The report suggests target for the Third Five-Year Plan as well as steps to achieve it. It is a useful document providing a comprehensive account of India's agricultural problems and their contribution towards the food emergency. In addition to detailing the many and varied rural problems, the publication also formulates an approach to circumvent them so as to make them contribute towards higher food production in particular and agricultural production in general. It is extremely difficult to do justice to the various issues raised in the report in a short review article of this nature. We would, therefore, confine ourselves to examining the recommendations regarding food production and the measures to reach the targets.

Food Production

The Team feels that a production target of 110 million tons by the end of the Third Plan period would both be essential and feasible. They have arrived at this target on the basis of the possibilities offered by the Indian situation, the increase in consumption by an estimated population of 480 millions at the end of the Third Plan through an addition of nearly 80 millions during the course of five years, the requirements of increased consumption arising from improvement in dietary habits due to higher incomes and employment, provision for poor crop years and in general maintenance of minimum food reserves to meet emergencies. The Team feels that although the average performances in productivity in various spheres in Indian agriculture are very low as compared to other advanced countries of the world, the best in Indian agriculture compares very favourably with the best elsewhere. They, therefore, feel that if the low average performance is pushed to the highest level attained by some Indian cultivators, the task would not be difficult of achievement. The Team feels that though India is making a steady progress in increasing food production, the rate is very slow and must be tripled if the Third Plan target of 110 millions is to be achieved. If the present rate of increase continues, the Team feels that the gap between supplies and target will be to the tune of 28 millions by 1965-66. This would involve a short fall of 25 per cent in terms of needs. They feel that besides being unwise to depend on imports of food or rationing, no amount of consolidated programmes under these two heads would meet a crisis of the magnitude described above.

It is difficult for one to express any opinion on the food production target suggested by the Team for the Third Plan. Composed as the Team was of eminent experts in the sphere of Agricultural Economics and Technology, it must

* Based on the Report on "India's Food Crisis and Steps to Meet It" by the Agricultural Production Team, sponsored by the Ford Foundation, Government of India, Ministry of Food and Agriculture and Ministry of Community Development and Co-operation, April 1959.

be presumed that they must have arrived at the target on the basis not only of needs but also the practical possibilities of achieving it. There are, however, a few points which arise in the mind of one closely associated with the developments in the country as also with its manifold rural problems. He would, for instance, desire to know actually how the target figure has been arrived at. The basis described in the report is sound and should help normally in arriving at correct requirements. However, it would be of interest to know as to how the various needs contribute to the target fixed and the extent of emphasis on each of them. If the report has elaborated the various factors like increase in food requirements due to increase in population, higher consumption due to improvement in the level of incomes, failures of the seasons, and needs of building up reserves, etc., probably, it would have helped us in getting a clearer picture of the target. This would not so much be from the point of view of academic exercise but also to emphasise the emergency in a correct perspective so as to awaken the people, particularly the rural communities, to the magnitude of the task and to prompt them to a greater effort.

In this connection, it would be useful to observe the trends in India's food production during the last 10 years in order to understand what we have been able to achieve and on the basis of it to project the possibilities of a bigger achievement. On the eve of the launching of the First Plan in 1949-50, the total food production in the country was 57.9 million tons. The production of foodgrains during the subsequent years was as follows :

1950-51 ..	52.4 million tons.	1955-56 ..	65.3 million tons.
1951-52 ..	52.9 " "	1956-57 ..	68.7 " "
1952-53 ..	58.8 " "	1957-58 ..	62.0 " "
1953-54 ..	68.9 " "	1958-59 ..	73.00 " "
(Estimates)			
1954-55 ..	67.1 " "		

Looking to the overall situation, it may be pointed out that the production from 1949-50 to 1958-59 rose by 15.1 million tons or by about 26 per cent. This works out to a rate of increase of about 2.6 per cent on an average. The estimates for 1958-59 have given rise to optimism about possible achievements during the remaining period of the Second Plan. Instead of about 75 million tons of production estimated by Foodgrains Inquiry Committee to be reached by 1960-61 as against the Second Plan target of 80 million tons, on the basis of the performance last year, we might, in all probability reach a level of production of 78 million tons in 1960-61. If this happens, the rate of increase in food production during 1949-50 to 1960-61 would roughly work out at about 3 per cent per year. If in 1960-61, India could produce 78 million tons of foodgrains, a target of 110 million tons in 1965-66 would be a jump of 32 million tons or an increase of about 41 per cent over a period of five years or a rate of increase of about 8 per cent per year. In the context of 2.6% rate of increase per annum during the earlier decade, an increase of roughly 41 per cent only in one plan period appears to be very ambitious. Similarly, a rate of increase of 8 per cent in the

Third Plan period in the context of the performance of the earlier two Plans appears to be credulous. This is, of course, an analysis of a student of agricultural economics who has little background of econometrics or statistics. This is based on past performance and probably does not take into account the potentialities of efforts in future. But it would be of considerable interest to be reassured of the practicability of the targets for the Third Plan. It would also be of considerable interest to the country to be told of the spheres in which we really have not made serious efforts to increase food production and which are precisely the weak links in the rural economy by bridging which it would be possible to produce phenomenal results.

The Team has also assessed the problem of rural unemployment and underemployment. Out of the 65 million rural families, 50 million depend directly on agriculture. Of these 50 million agricultural families, 20 million have little land. Actually, about 10 million of the group are landless. It is among this group that chronic underemployment and unemployment prevails. Moreover as rural population increases, the number of landless will further grow. It will be one of our major tasks to find work for this surplus work-force. The Team feels that the idle labour force can be employed to increase output. Employment of over-abundant rural labour would bring important social gains as well. The idea would seem sound, the only difficulty is to concretely spell out appropriate resource combinations in agriculture with considerable emphasis on labour utilisation. The problems of work opportunities and labour availability and the concomitant organisational issues of co-ordinating both are major issues, requiring serious thought.

Another interesting point about the Team's recommendation on priorities for public works programme to achieve quick rises in food production will need an effort at the stage of implementation. Priority is suggested for activities which will make the greatest and the most immediate contribution to food production, and where serious rural unemployment prevails. It would require some effort to locate problem areas with high food production potential.

Price Stabilisation

To ensure incentives to higher production the State should come forward to guarantee minimum prices to the cultivator in advance of the planting seasons. The additional measure recommended to serve as a fillip to this incentive is a market to the cultivator for his crop at minimum prices whenever he wants to sell. This market should be available to him at a distance which he can cover conveniently by a bullock cart. The above two would inevitably meet the need for local storage of crops and to ensure an even flow of commodities at reasonable prices.

The Team suggests a permanent machinery which would formulate the price policy and implement it with the required action. It, however, envisages very comprehensive and hair-splitting functions for this agency. For instance, the pricing agency is expected to determine the base prices and the permissible range of their variations. It is also expected to announce the prices in advance of the sowing season. It should also initiate purchase or sale of foodgrains according

to circumstances. Furthermore, it will determine the location for stock of reserves of foodgrains at different places and at different times according to the requirements of the situation, and for that purpose, determine export and import duties and quotas to control prices as may be necessary. Finally, as a measure of effectiveness, these agencies should also undertake grading.

In order to understand the magnitude of the task allotted to the permanent price determining and enforcing agency, it would be appropriate to recapitulate some of the basic conditions of prices in our country. The discrepancy between the producer and the consumer prices of foodgrains in particular and agricultural commodities in general is wellknown. Besides, these vary from region to region. This state of affairs is due to a variety of factors such as defective marketing system, inadequate or absence of grading, regional variations in production and prices, and lack of knowledge of market conditions on the part of cultivators not only in different parts of the country, but also in the same areas. All these contribute towards a state of affairs where agricultural prices in general and food prices in particular continue to be in a perpetual mess. It is this situation which gives rise to excessive consumers' prices coupled with low returns to the cultivator of foodgrains. It is precisely this situation that acts as a serious handicap in our planned effort in which the plan expenditure continues to mount up without a corresponding relief to the agricultural sector and does not result in higher food production, and better marketable surplus which can be made available for urban consumption. In a situation of this nature, and in the context of lack of any background and experience whatsoever, the array of functions envisaged for permanent pricing agency appear to be formidable. A simple pricing and distribution mechanism which would iron out these discrepancies in the existing situation and give improved returns to the cultivators without unduly burdening the consumer would be more welcome.

But it is not merely the elaborate objectives of price stabilisation that is puzzling but also the criteria laid down for price fixing which add a good deal to the task. For instance, the Team suggests that a number of factors should go in to the fixing of minimum prices. The prices, for example, should protect the cultivator against unduly low prices and losses. It should even out seasonal fluctuations by sustaining prices during the harvest season and ensure a smooth operation for the market by ironing out flux and scarcities except for those quantities required by the Government for buffer-stock operations. The prices besides should be set at a level which would not cause hardships to the consumers. It should also be set at levels which would achieve required production and marketable surplus. Further, the floor prices for the producers should not be oblivious to the best interests of the economy as a whole for if the prices are set too high, it will become a drain on the national treasury. The Team feels that under Indian conditions, large-scale transfer payments between the agricultural and other sectors of the economy are not feasible. Added to these are certain other wider requirements in price fixing. While fixing the prices, the Team says, that the agency should take into account the domestic and world supplies of foodgrains and on the basis of import prices as well as the domestic demand, the floor should be arrived at. The price guarantees should be with reference to different foodgrains with due regard to competition from other crops and also should take into account the handling margins and fluctuations in production. The Team appears

to have been conscious of the complexity of agricultural price stabilisation in India, for, they suggest modest beginnings. It has been suggested that the minimum prices for rice and wheat alone should be fixed to begin with on an All-India basis and for the other foodgrains on a regional basis.

One more rider added to the price fixing programme which is not likely to be appreciated is the suggestion of the Team that if possible and on the basis of other favourable circumstances, the floor price should be fixed 10 to 15 per cent below the prevailing import prices, depending of course on the proportion of imports to production. It is true that the international food prices appear to be relatively high as indicated by the prices we are paying for our food imports. But it is also true that in the artificial conditions created by control and exchange regulations, the free market forces are held considerably in check. In the context of a freer international trade, the food surpluses of some of the regions where agriculture is highly commercialised are likely to overwhelm the economies of under-developed areas. If this suggestion of a lower minimum domestic price was to have effect, it is extremely difficult to gauge the effectiveness of agricultural floor prices as production incentives in a country like India. There is little controversy about the need for a certain artificially pegged prices to achieve higher production in a difficult situation obtaining in our country. In this context, it is very likely that domestic prices might appear to be a little out of tune with the world prices, particularly in those spheres where production is meant primarily for home consumption. In view of this, it is not possible to visualise how far a relationship of domestic prices with world prices as envisaged by the Team would have the desired effect.

Land Reforms and Co-operative Farming

The main features of our land reforms in a nutshell relate to the reorganisation of tenurial patterns with a view to eliminating the difference between ownership and occupation. In the ryotwari tracts, the emphasis has been on the security of tenancy and fixation of reasonable rents. In some States like Bombay and Kerala, we have gone further and in a larger or smaller measure attempted to eliminate tenancy cultivation altogether. There are non-official efforts at reorganisation of land ownership in the form of *Gramdan* and *Bhoodan* but they fall more or less in the same pattern as aiming to achieve social justice and economic equality in the rural sector by giving land to the landless and the small peasant. The latest in the arena are ceilings on the land holdings and co-operative farming. In this broad framework of our pattern of land reforms, it would be interesting to examine the recommendations of the Team and ascertain how far the suggestions conform to our approach or how far they offer grounds for introspection.

There is considerable force in the feeling expressed by the Team that there is a good deal of uncertainty about land reforms in our country which adversely affect food production. In addition to limited effectiveness of legislation already enacted, the various laws are being revised frequently. New measures are adopted which besides being more radical than the old introduce absolutely a new element in the situation. All these leave no time for the changes to take effect or give scope for ascertaining whether a particular piece of legislation was useful and effective or not. The Team has mentioned two very significant facts about land

reforms. They say that whereas it is imperative to bring social justice to the rural sector by sparing land for the landless, it is equally essential to see that these objectives are achieved in a way that will not retard the increase in food production so vital to national well-being. One of the suggestions which the Team makes is extremely interesting in this context and would be shared by quite a few in the country. They say that many landless labourers would consider more secure employment at relatively higher wages than what they get now, just as much of an improvement in their conditions as membership in a joint farming co-operative or getting possession of some lands here and there. They have also pointed out that in this process of redistribution of agricultural lands equitably, care should be taken to see that independent and capable leadership among the cultivators is not only preserved but progressively nurtured. Another very material recommendation which has a direct relation with the redistribution of lands among the landless is the emphasis on the need for keeping the pattern flexible so as to leave scope for adjustments in land holdings and farm sizes when non-farm employment opportunities improve and a shift of population from agriculture becomes feasible. It is thus necessary to avoid freezing a pattern of land tenure that cannot be modified to meet changing conditions. Equally important is the emphasis the Team lays on standards of minimum resources per family along with a ceiling on holding which would create the right circumstances for achieving improvement in productivity with a certain minimum of combination of resources and land.

The Team favours co-operative joint farming on a voluntary basis. They have, however, indicated that just as a minimum unit of land and resources are desirable in the case of a peasant farm, in the case of co-operative farming also their deficiencies would not provide an adequate living. They also feel that co-operative farming as envisaged by them will be achieved slowly and, in the meantime, it would be desirable to encourage service co-operatives in which a number of farm units operated either by owners or tenants would come together in a co-operative organisation to secure jointly agricultural equipments like bullocks or mechanical power. They have also suggested that co-operative farming would more conveniently be organised where the landless are allocated land, as in such a situation, it would be possible to keep the ownership of the land with the State although its operation is transferred to the individuals. Such a group can then be made to join into a co-operative by which they will jointly own and operate equipments and also assist in planning and conducting their farm operations. The Team, however, feels that in many areas the land that will be available for distribution among the landless might not be suitable for operation in large tracts.

While discussing co-operative farming, however, the Team's emphasis has been on two or three material considerations. In recommending agrarian change, their emphasis has always been on opening out alternative sources of employment which would relatively offer better economic conditions to the surplus agricultural population. They have also emphasised the importance of economic incentives in agriculture. They say, "management assistance to cultivators, combined with supervised credit and perhaps with joint ownership of equipment, offers a way to obtain the advantage of better management while still retaining the incentives gained by individual operation." They have said that individual attention to land is a powerful drive for improvement of operations. They have also em-

phasised the significance of combining rights and privileges with responsibilities. It would thus be useful to lay down certain minimum standards of performance in the interest of higher food production.

Likewise about the consolidation of holdings, they have emphasised the need for satisfactory settlement of tenurial problems including land ceiling so that the course of progress of consolidation can have a sure ground to proceed. The more important thing, however, which they have emphasised is the need for combining measures for land consolidation with soil and water conservation planning so that it would be possible to co-ordinate the work in both the spheres and save a large area of land that would be required for field irrigation, canals, drainage ditches, contour bunds, etc. Their idea seems to be that if the irrigation canals, etc., could be laid out on the boundaries of holdings and a provision made for them during land consolidation, it would minimise considerably the waste that is otherwise involved in laying them out later on. They also emphasised the need for preventing fragmentation of small holdings into tiny uneconomic units. This is essential both for the purposes of not allowing this problem to be intensified as time passes as also to prevent deconsolidation of consolidated holdings. For this purpose, they feel that a draft legislation be prepared for circulation among various States which do not have such laws to achieve a large measure of uniformity of approach in this sphere.

A few conclusions which emerge from the suggestions of the Team may be noted in passing. The suggestions of the Team have a good deal of force from the point of view of attaining higher productivity in agriculture as also keeping the pattern of the rural structure flexible for future growth and improvement. They have very usefully said that the radicalism that we have introduced in our land reforms to achieve social justice and economic equality should be tempered with the need for providing leadership among the cultivators as also to ensure resource availability. It would, therefore, be useful for the policy makers to devote serious consideration to these suggestions and see how far they could be utilised to our advantage.

Co-operation

Between the report of the All-India Rural Credit Survey Committee, the resolution of the National Development Council and its amplification by the Working Group on Co-operative Policy, the thoughts on the subject seem to be in a melting pot. The average Indian is left wondering as to what is good and what is bad in the sphere of agricultural co-operation.

It is desirable that the co-operative movement should rise from the peasantry and that it should be fully voluntary in character. It is equally laudable that the co-operative structure should be self-contained with regard to resources, leadership and management. But the basic conditions in agriculture and rural communities do not afford proper grounds for their achievement. It was in this context that a measure of supervision from above was thought essential in various co-operative institutions. We have started or converted about 6,000 large-sized co-operatives on the basis of the recommendations of the All-India Rural Credit Survey Committee. The large-sized co-operative has been more successful in

areas where cash crops predominate. Elsewhere the small-size village co-operative has indicated better recoveries and lower overdues. The training programme and the effort to equip the large-sized co-operative with efficient and experienced staff is on way and probably would show good results in course of time. It is, however, too early to say what these large-sized co-operatives would ultimately achieve. If some time had lapsed and a clear picture of their working would have been available, probably our ideas on them would have crystallized better.

In a country of continental dimensions, the few large-sized co-operatives with the new system of advancing loans in a sector which has insatiable credit needs would require a fairly long time to indicate clear trends. It is equally true that with the bulk of the agricultural sector on a subsistence level and the marketable surplus growing very slowly, and the peasantry not trained and accustomed to co-operative approach and, therefore, not capable of providing necessary leadership, a simple co-operative structure would be more appropriate. A complicated and variegated structure comprising of a variety of co-operative institutions specialising in various useful activities can take root only slowly as economic advancement and enlightenment come about. In this context, it is very difficult to appreciate the recommendation for the creation of a multiplicity of rural co-operative institutions specialising in a number of functions and co-ordinated with each other by a complicated procedure of administration and working.

It will be useful to examine the recommendations of the Team in the context of the above, and to find out how far it helps to clarify issues or usefully supplement ideas so as to bring about a feasible structure. The Team seems to be agreeing with the idea of a co-operative credit union covering a wider area than a village. It also favours a multi-purpose village co-operative. Thus on both these, it largely agrees with the resolution of the National Development Council. There are, however, a number of useful suggestions made by the Team to make the co-operative movement more effective and useful as well as to instill ideas about co-operative activities which might not have been hitherto fully understood. The Team, for instance, argues that co-operative institutions cannot be successful by magic. They can succeed only if they could perform economic functions better than they are now being performed. Thus it bids a good-bye to the popular belief largely ingrained among large sections of rural communities that co-operatives are by and large relief institutions. The Team has also suggested that the crop loan system is making headway very slowly. Besides, the credit available from the societies is not timely. Under both these counts, the Team suggests a radical approach to make the credit effective and timely. The lack of supervision over crop loans and the absence of link between productivity and production on the one hand and credit on the other to ensure repayment is also emphasised. To link production and adequate marketable surplus with the volume of credit, it is necessary to bring about a co-ordination so that both credit and surplus grow mutually and at a rapid rate. For this purpose, not only the management of the co-operatives but also the extension staff and in particular the technicians who advise and evolve plans for technological improvement in agriculture should operate in a co-ordinated way. If this happens, the nature and extent of credit would be linked up with its actual applicability and will be fully utilised with the objectives for which it was extended. It would thus not only promote

higher production but also go a long way in creating a machinery for expeditious, timely and adequate credit.

The Team also agrees with the procedure for linking credit with marketing, but adds that the co-operative structure in which marketing and credit are linked should also serve as an agency for price stabilisation on the lines discussed earlier. The details of this arrangement are not available but if properly worked, the system should normally ensure effective reasonable prices to the agriculturist. The need for storage and construction of godowns has also been emphasised. They have also laid emphasis on the co-operatives taking over the processing of agricultural produce and recommended starting rice mills on co-operative basis in major rice producing areas. They have even suggested that where possible, both the credit co-operatives as well as the marketing and multipurpose institutions should have certain minimum storage facilities of their own which they can utilise to the advantage of their members. The Team has also laid considerable emphasis on evolving non-official leadership. They have said that domination of co-operatives by the Government is not desirable.

It could thus be found that the Team has very largely corroborated the resolutions of the National Development Council. Of course, in some measure, they have offered suggestions for making the movement more useful and its working more effective. But their recommendations do not clear the uncertainties regarding the lines on which the co-operative movement should proceed to ensure a minimum measure of success.

Organisation

The Team indicates a number of economic, technological, organisational and structural changes which would help the country to reach the target of production. So far as the technological measures are concerned, one would not normally venture to express an opinion or attempt an analysis. It must, however, be said that particularly in this sphere probably our country has done little in comparison with what could be done and what has been done elsewhere in the world, and therefore, those practical suggestions should receive very serious thought and attention. In the sphere of community development also, the Team has rightly pointed out that the Community Development and Rural Extension have so far remained a generalised statement of aspirations rather than a programme and sooner it is translated into concrete activities, better it would be for agriculture of the country. They have also pointed out the respective roles of the village level worker, the Block Development Officer, the technician who advises the administration and the respective roles of the State and Central Government in making these programmes a success. The Team has pointed out how the functions and energies of the workers at different levels have been put to wrong use and that their aptitude and abilities not channelled in the right direction. If readjustments are carefully made with regard to the functions and the jurisdiction, the work would not probably suffer and we may not remain doubtful regarding the effectiveness or otherwise of the various agencies connected with rural development. In the matter of organisational lacunae which have been indicated by the Team in a number of spheres, they appear to be putting their finger on the right spot. It has been largely accepted that our planning, particularly the Second

Plan has not been very effective due to organisational weaknesses. If the organisation has been soundly conceived and properly effected, probably both in the matter of expenditure and targets, we would have been able to do much better than what we have actually achieved.

Livestock

Of all the valuable suggestions the Team has proffered, the one on the cattle problem should have an undivided appeal. On the basis of the available statistics of cattle population of 203 million of which 155 million are cattle and 48 million buffaloes, India possesses one-fourth of the world's cattle population required for dairying. Denmark has the densest cattle population in the World and India is only next to her in the matter of livestock density. The cattle population is far in excess of the available fodder and feeds. From this point of view perhaps about half the cattle are surplus. This situation is accentuated by a continuous substantial annual increase in cattle numbers. This excess of cattle population in relation to the supplies and the loss that they inflict on the country's rural economy are vividly brought out by the Team through an interesting analysis. It is suggested that the production of organic manure suffers both in quality and quantity as a result of the excessive number. Every unwanted animal eliminated would, through economies in maintenance, ensure an additional production of 365 lbs. of milk annually. The Team suggests that if an economy could be effected in the use of fodder and feeds by eliminating the useless and surplus animals and putting in the supplies so saved to feed the remaining cattle wealth, we would be able to increase the production of milk and milk products by Rs. 70 crores annually. This would mean significant improvement in the nutrition of the Indian child.

The Team looks with disfavour the efforts of a number of State Governments to impose a ban on cattle slaughter. They feel that it is neither judicious nor practical. They also feel that unless the approach to cattle slaughter is properly revised, it will not ensure the economic utilisation of cattle. This in its turn would impede the promotion of sound animal husbandry industry ancillary to agriculture and impede in consequence the resultant contribution by this subsidiary to increase food production.

The Team is conscious of the deep religious feeling and the sentiments against cow slaughter and also appreciates India's political and socio-religious system while making the above suggestions. It is for these reasons that the Team has some ingenuous suggestions to offer to eliminate surplus cattle without in any way directly affecting the deep-rooted sentiments. They suggest a graduated tax on cattle which would make the maintenance of useless cattle a burden on the owners. The other recommendations relate to measures by which the multiplication of cattle is severally restricted so that only a good breeding programme would ultimately emerge. Finally, they suggest control on open grazing which is both detrimental to good animal husbandry and breeding programme and to the production and use of fodder and feeds. The other measures relate to the economic utilisation of fallen carcasses and the use of animal by-products for various industrial and agricultural purposes.

These appear to be soundly conceived and if introduced would not only lead to the elimination of unwanted cattle but also to a sound animal husbandry industry in the country. Probably, of all the recommendations contained in the Team's report, those relating to the cattle of the country appear to be simple and easily enforceable. If they could be pursued, the solution of the cattle problem would significantly add to food production as well as to the nutritional standards of the population, particularly the younger section.

Averting a Crisis (World Crops, May 1960)

WE ARE greatly impressed by the findings in a report (summarised in *World Agriculture*) submitted in 1959 to the Government of India by a team of experts from the U.S.A. The report observes that at the present rate of increase of production India's 110-million ton target of food grains set for 1965-66 will fall short by 28 million tons and that no conceivable programme of imports and rations can meet a crisis of this magnitude. They believe, however, that the target may be reached if food production is given the highest priority and is sponsored by the topmost leaders who can mobilise the nation for action to meet the impending crisis.

It is pointed out that the targets for fertilisers are soundly based but conservative in relation to needs. Nevertheless, they mean a ninefold increase in the use of nitrogen and large increases in phosphates and potash. The team recommend that the procurement of these quantities be given top priority, including foreign exchange if necessary.

India, the team says, is wasting her water resources; not only does she use but a small portion of the potential water supply — which is one of the largest in the world — but she obtains only $\frac{1}{5}$ — $\frac{1}{4}$ ton increase in yield on irrigated land as compared with non-irrigated lands, and only about 12% of the irrigated land grows more than one irrigated crop a year. They are of the opinion that India can make greater and more immediate gains in food production by concentrating on water management rather than by constructing large-scale irrigation projects which take years to develop. They consider that millions of acres could thus be reclaimed.

Tremendous potentialities exist for increasing production per acre, for there are no inherent soil, climatic or other physical reasons for the present low yields. Selected crops and areas in each State should be chosen which have the greatest increase potential. Efforts to stimulate food production should be directed chiefly on rice and wheat, which together make up more than half the total food grains. With hybrid maize, India could, in five to seven years, make more progress in increasing yields than the U.S.A. made in 20 years.

The report has given great publicity not only to the major problems, but has also drawn attention to weaknesses in the agricultural organisation in India. India need not feel discomfited by this somewhat critical attitude, for, after all, exactly the same criticisms apply to a number of countries — and not merely those in Asia. At the same time we recommend that other countries should study this report, for they may find considerable food for thought in its pages and other applications of its recommendations.

